AXIOMTEK

eBOX660-872-FL Series

Embedded System

User's Manual

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. The eBOX660-872-FL does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.
2. Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.
3. Disconnect the power cord from the eBOX660-872-FL before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the eBOX660-872-FL is properly grounded.
4. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
5. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.
6. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -20℃ or above 80℃. It may damage the equipment.
7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:
   - Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.
   - When handling boards and components, wear a wrist-grounding strap, available from most electronic component stores.

Classification

1. Degree of production against electric shock : not classified
2. Degree of protection against the ingress of water : IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
4. Mode of operation : Continuous

General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.
2. Turn the system off before you start to clean up the component or computer.
3. Never drop the components inside the computer or get circuit board damp or wet.
4. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.
5. Try not to put any food, drink or cigarette around the computer.

Cleaning Tools:

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be able to be cleaned using a product designed for cleaning that component, if this is the case it will be mentioned in the cleaning.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend you to rub it with a piece of cloth.
- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastics parts.
- Vacuum cleaner: Absorb the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.
- Cotton swabs: Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and other locations.
- Foam swabs: Whenever possible it is better to use lint free swabs such as foam swabs.

NOTE: ***We strongly recommended that you should shut down the system before you start to clean any single components.***

Please follow the steps below:

1. Close all application programs
2. Close operating software
3. Turn off power switch
4. Remove all device
5. Pull out power cable

Scrap Computer Recycling

If the computer equipment's need the maintenance or are beyond repair, we strongly recommended that you should inform your Axiomtek distributor as soon as possible for the suitable solution. For the computers that are no longer useful or no longer working well, please contact your Axiomtek distributor for recycling and we will make the proper arrangement.

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CHAPTER 1
INTRODUCTION

This chapter contains general information and detailed specifications of the eBOX660-872-FL. The Chapter 1 includes the following sections:

- General Description
- System Specification
- Dimensions
- I/O Outlets
- Packing List

1.1 General Description

The eBOX660-872-FL is an embedded system that supports Socket G2 Intel® Core™ i7/i5/i3/Celeron processor to support Windows 7, Windows 7 Embedded, Windows 8, Windows 8 Embedded or Linux, suitable for the most endurable operation.

It features fan less design with full feature I/O, two 204-pin unbuffered SODIMM socket for dual channel DDR3-1066/1333 MHz memory, and enhanced system dependability by built-in Watchdog Timer.

- **Features**
  - Intel® Ivy Bridge HM76 Platform
  - Support Socket G2 Intel® Core™ i7/i5/i3/Celeron processor
  - Maximum to 16GB DDR3 1066/1333 MHz memory
  - Compact and fanless design
  - Supports 4 USB 3.0 ports
  - Supports 4 jump-less RS-232/422/485
  - Supports 4 10/100/1000Mbps Ethernet ports
  - One DisplayPort
  - One VGA
  - One 2.5" SATA HDD drive bay
  - One front access CFast
  - Watchdog timer
  - Wide Range 10-30VDC input
  - Dual Express Mini Card slot with SIM slots
  - Antenna openings

Reliable and Stable Design

The eBOX660-872-FL adopts the advanced cooling system and supporting the CFast™, which makes it especially suitable for vibration environments, best for industrial automation, digital signage and gaming application.

Embedded O.S. Supported

The eBOX660-872-FL not only supports Windows 7, Windows 8, but also supports embedded OS, such as Windows 7 Embedded, Windows 8 Embedded and Linux .

Various Storage devices supported
For storage device, the eBOX660-872-FL supports one 2.5" SATA storage drive bay, and one CFast™ slot.

1.2 System Specifications

1.2.1 CPU

- **CPU**
  - Socket G2 Intel® Core™ i7/i5/i3/Celeron processor
  - Working temperature depends on TDP of processor, please refer to 1.2.3 System Specification
- **Chipset**
  - Intel® Ivy Bridge chipset
- **BIOS**
  - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.
- **System Memory**
  - Two 204-pin unbuffered DDR3 1066/1333MHz SO-DIMM socket.max. up to 16GB

1.2.2 I/O System

- **Four jumper-less RS-232/422/485. COM1~COM4 for full function 9-pin D-Sub male connectors**
- **One VGA connector for display**
- **Dual DisplayPort for display**
- **Two Audio connectors (Mic-IN, Line-OUT)**
- **Four RJ-45 connectors for 10/100/1000Base-T Ethernet ports**
- **Four USB 3.0 connectors**
- **Four Digital Input and four Digital Output for digital I/O phoenix connector**
- **One 10-30V wide range DC input connector**
- **Six Indicators (System Power, HDD Active, LAN1 link, LAN2 link, LAN3 link, LAN4 link)**
- **One Reset switch**
- **One AT/ATX switch**
- **One Power switch**

1.2.3 System Specification

- **Watchdog Timer**
  - 1~255 seconds or minutes; up to 255 levels.
- **Power Supply**
  - 10-30V wide range DC input connector
- **Operation Temperature**
  - -20℃ ~ 70℃ (-4 ºF ~ 158ºF), with TDP 35W
  - -20℃ ~ 60℃ (-4 ºF ~ 140ºF), with TDP 45W
- **Storage Temperature**
  - -40℃ ~ 80℃ (-4 ºF ~ 176ºF)

- **Humidity**
  - 10% ~ 90% (non-condensation)
- **Vibration Endurance**
  - 1Grm w/ CFast and SSD (5-500Hz, X, Y, Z directions)
- **Weight**
  - 3.8 kg (8.37 lb) without package
  - kg(10.14 lb) with package
- **Dimensions**
  - 280mm(11.02") (W) x190mm(7.48") (D) x 76mm(2.99") (H)

1.2.4 Driver CD Content

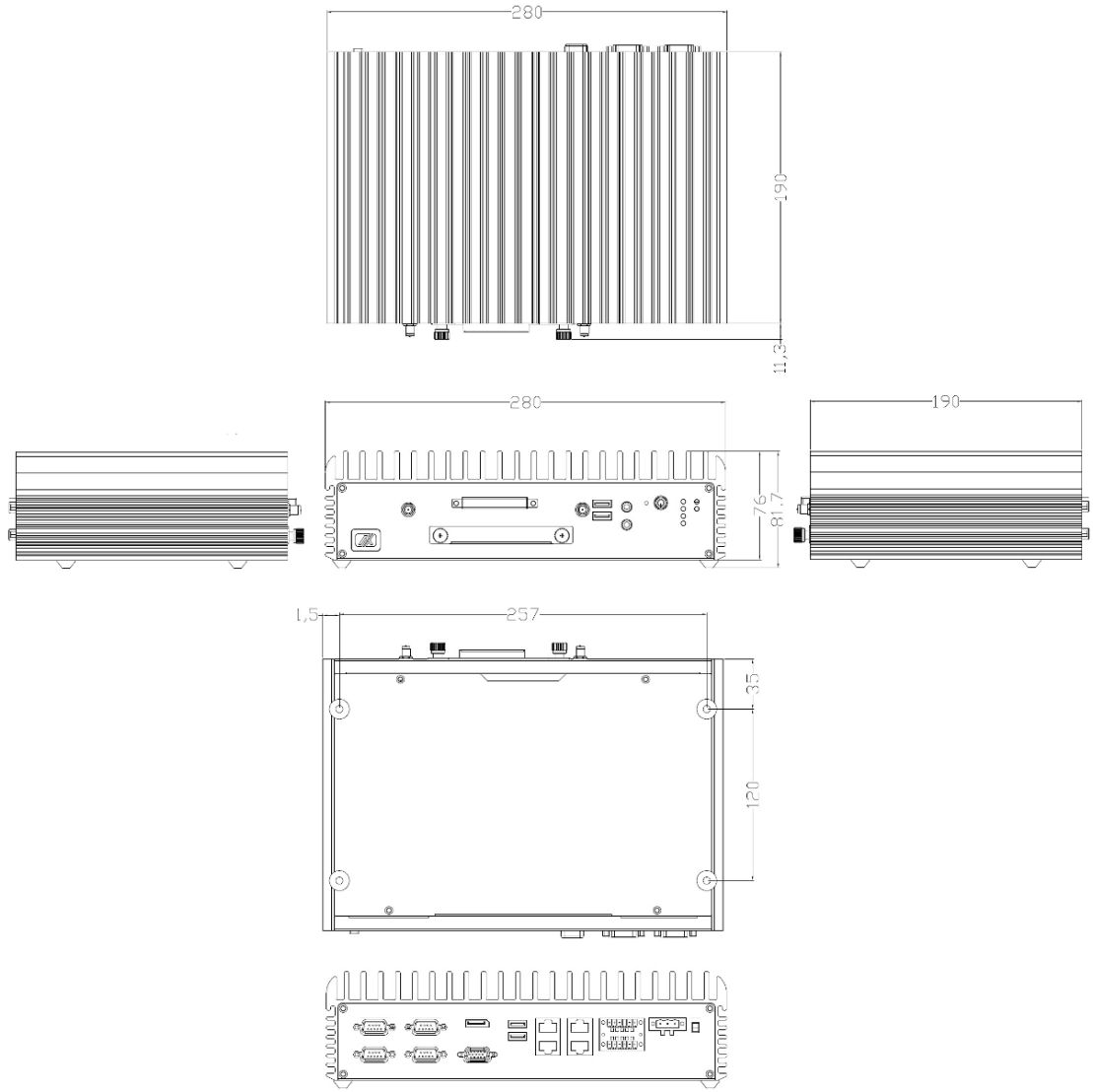
- **Driver**
- **Audio**
- **Chipset**
- **Ethernet**
- **Graphic**
- **Manual**
  - User Manual
  - Quick Manual

***NOTE*: All specifications and images are subject to change without notice.**

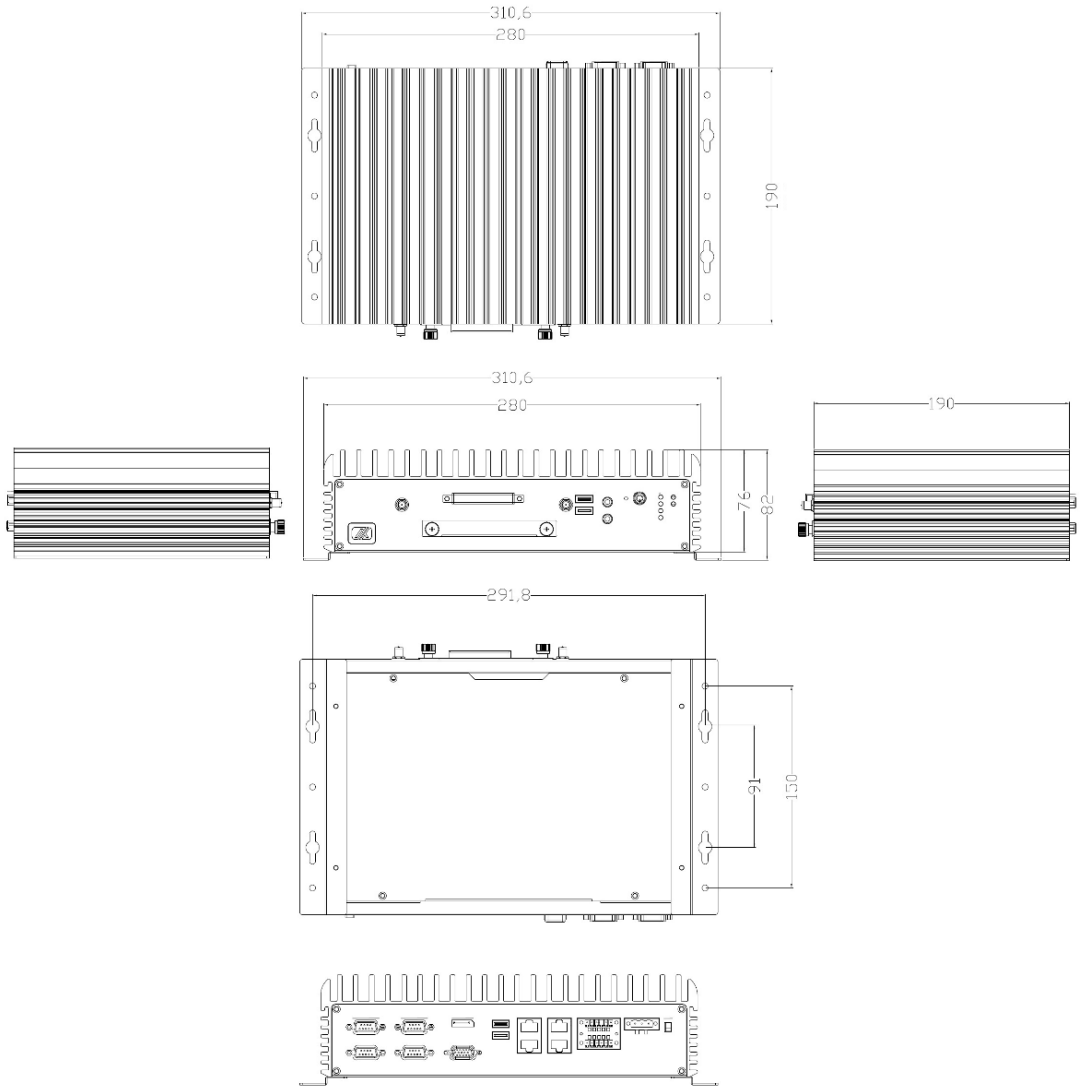
1.3 Dimensions

The following diagrams show you dimensions and outlines of the eBOX660-872-FL.

1.3.1 System Dimension



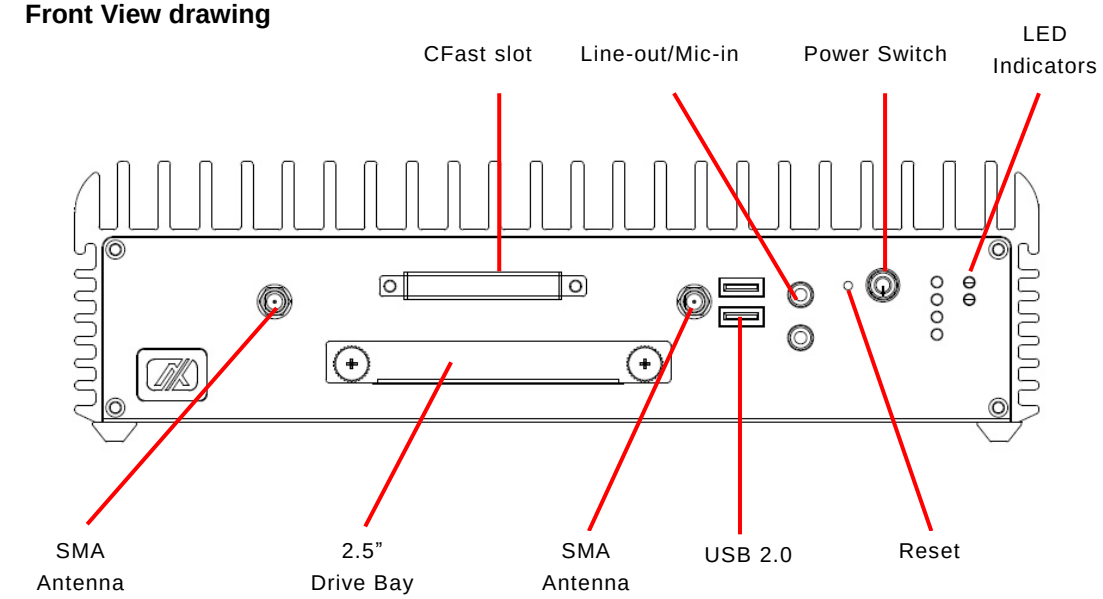
1.3.2 Wall mount Bracket Dimension



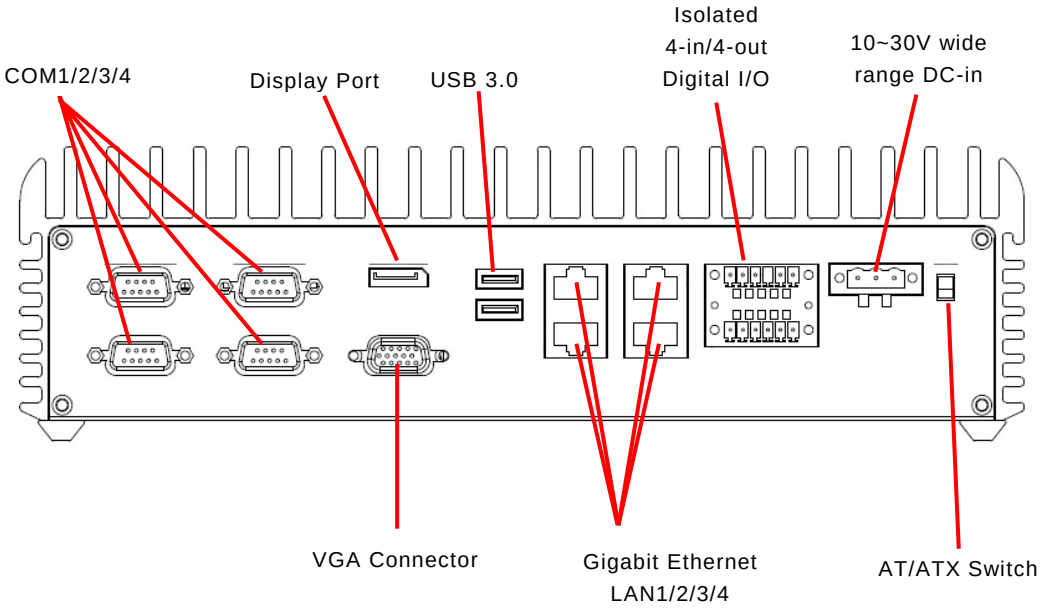
1.4 I/O Outlets

The following figures show you I/O outlets on front view of the eBOX660-872-FL.

- **Front View drawing**



- **Rear View drawing**



1.5 Packing List

The package bundled with your eBOX660-872-FL should contain the following items:

- **eBOX660-872-FL System Unit x 1**
- **eBOX660-872-FL Quick Installation Guide x 1**
- **CD x 1 (For Driver and Manual)**
- **Screws Pack x1**
- **Pre-install Intel Processor**
- **Pre-install Foot pad x4**
- **Optional DDR3 SODIMM**
- **Optional Wall-mount Brackets**
- **Optional Antenna**
- **Optional Mini Card module**
- **Optional 2.5" SATA Storage**
- **Optional CFast™Card**

1.6 Model List

eBOX660-872-FL-i7-3610QE-DC	Fanless Embedded System with Intel Core i7-3610QE (4 Cores) 2.7G Processor, VGA, DisplayPort, GbE LAN*4, USB3.0*4, Audio, Isolated RS-232/422/485*4, Isolated DI*4/DO*4, 10~30VDC
eBOX660-872-FL-i5-3610ME-DC	Fanless Embedded System with Intel Core i5-3610ME (2 Cores) 2.7G Processor, VGA, DisplayPort, GbE LAN*4, USB3.0*4, Audio, Isolated RS-232/422/485*4, Isolated DI*4/DO*4, 10~30VDC

If you cannot find this package or any items are missing, please contact Axiomtek distributors immediately.

CHAPTER 2
HARDWARE INSTALLATION

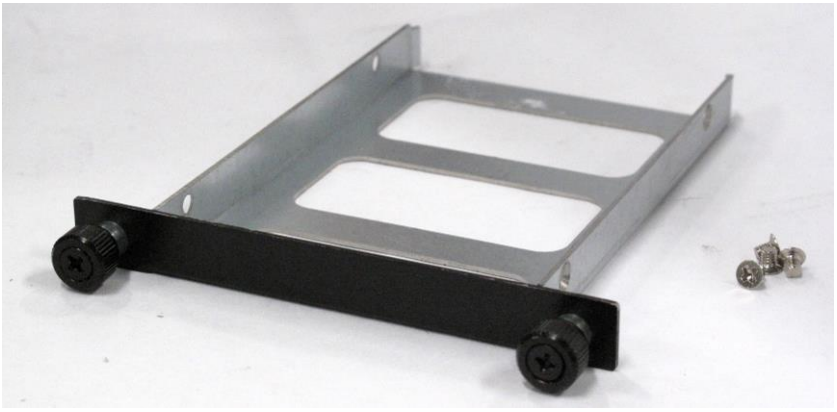
The eBOX660-872-FL is convenient for your various hardware configurations, such as HDD (Hard Disk Drive), SSD (Solid State Drive) CFast™ card or PCI Express Mini Card modules. The chapter 2 will show you how to install the hardware.

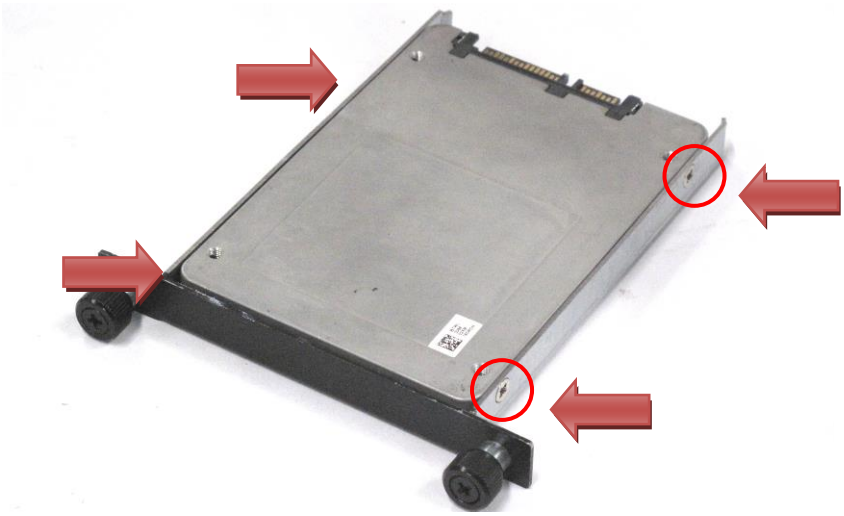
2.1 Installing the 2.5" SATA Device

Step 1 Turn off the system, and unplug the power cord.
Step 2 Turn the system to the side with HDD Bracket.
Step 3 Locale the 2.5" HDD Bracket, loose two thumb nail screws.

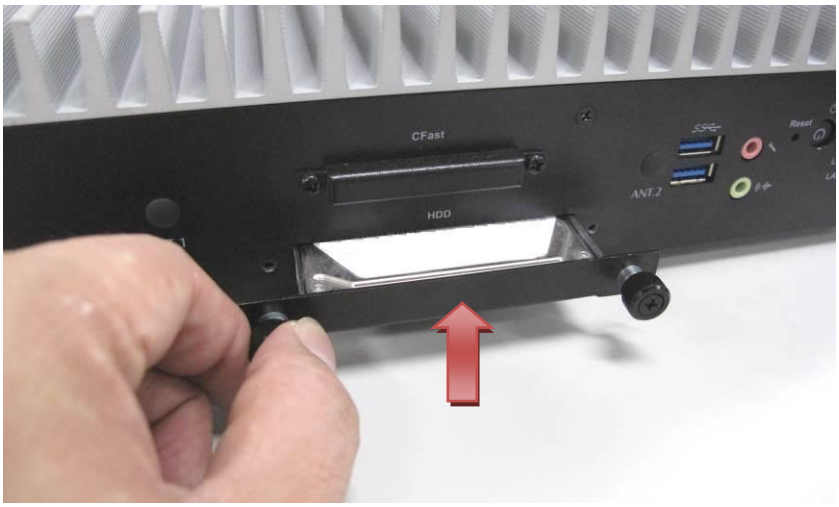
Step 4 Pull out the HDD Bracket smoothly

Step 5 Assembly the HDD bracket together with the 2.5" SATA device





Step 6 Slide HDD/SSD bracket module into position to connect SATA signal and power to SATA device.

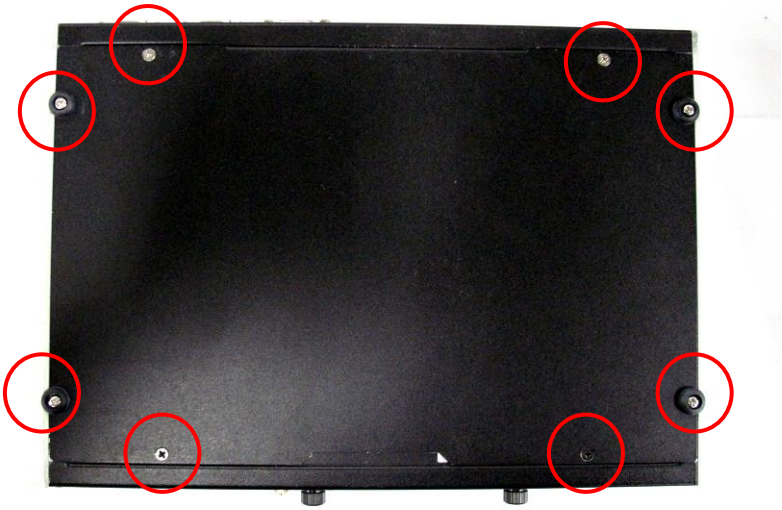


Step 7 Fasten screws of HDD bracket

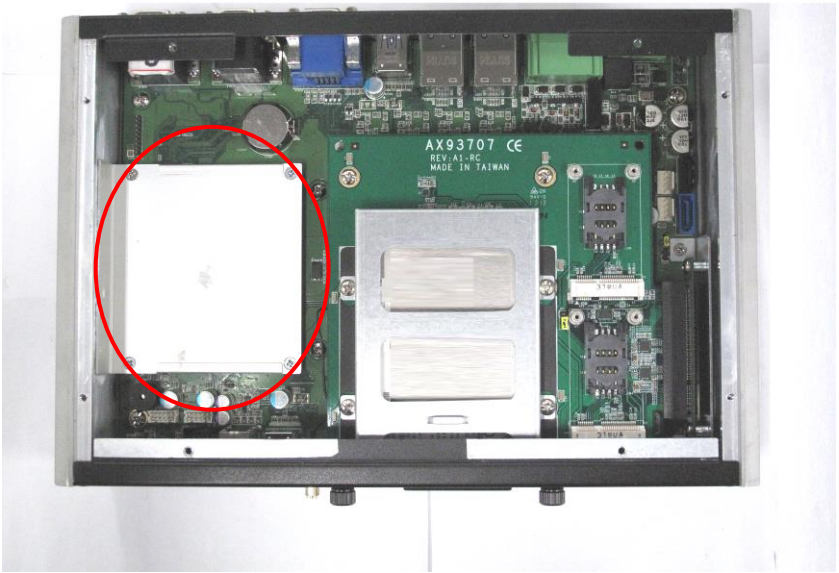
.

2.2 Installing the Memory Module

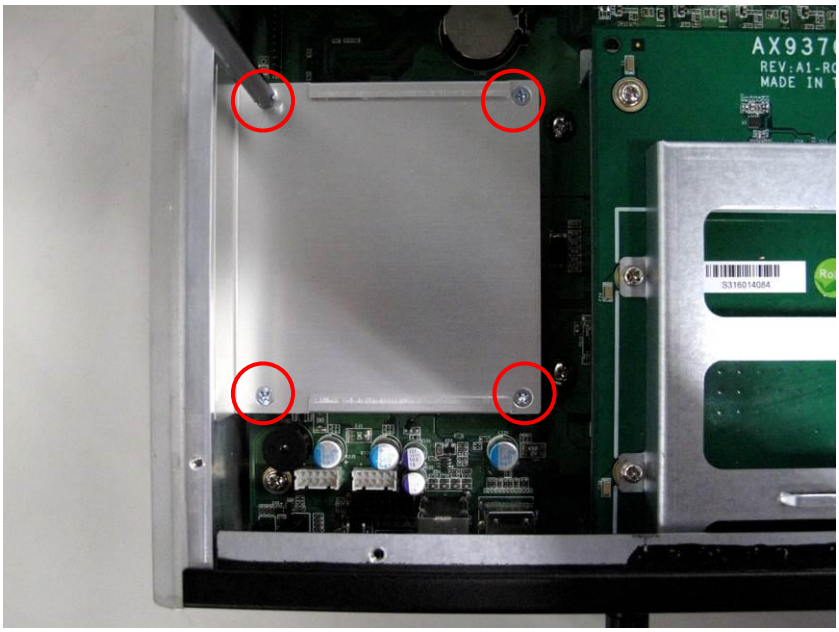
Step 1 Turn off the system, and unplug the power cord.
Step 2 Turn the system upside down to locate screws at the Bottom, loosen screws.



Step 3 Remove the bottom cover to locate the Memory Heatsink screws

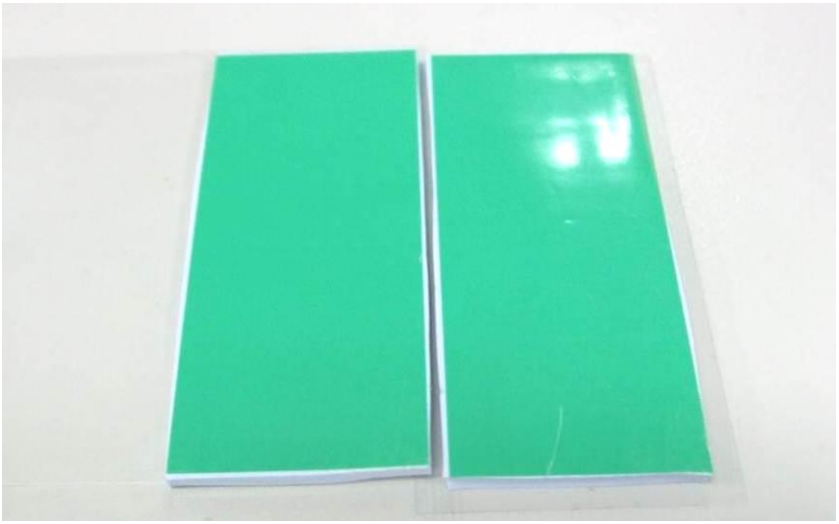


Step 4 Loosen screws.

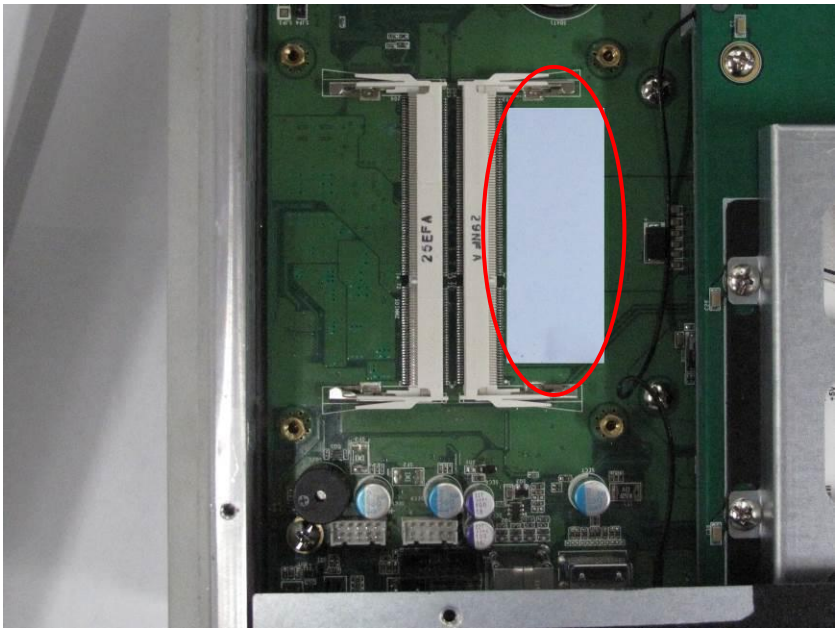


Step 5 Remove Memory heatsink

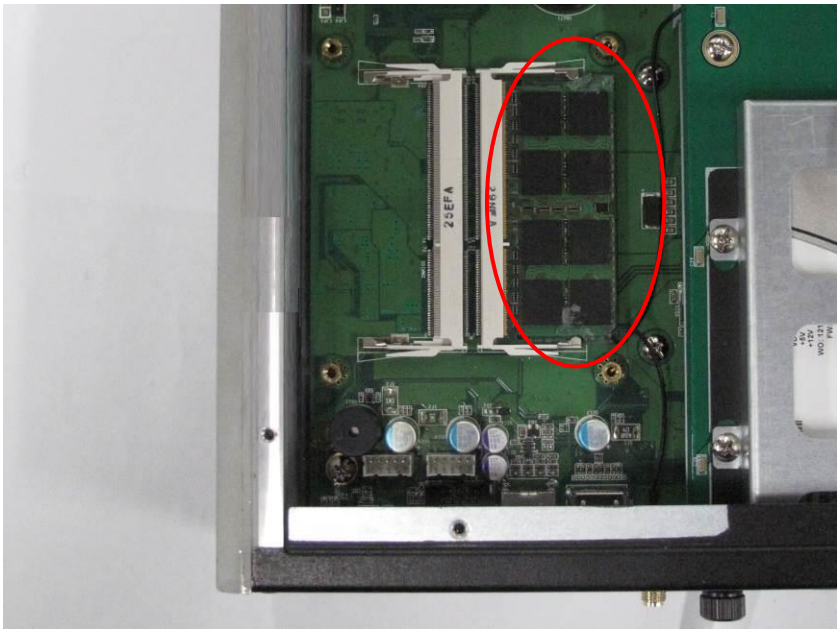
Step 6 Take out the thermal pad from accessory kit



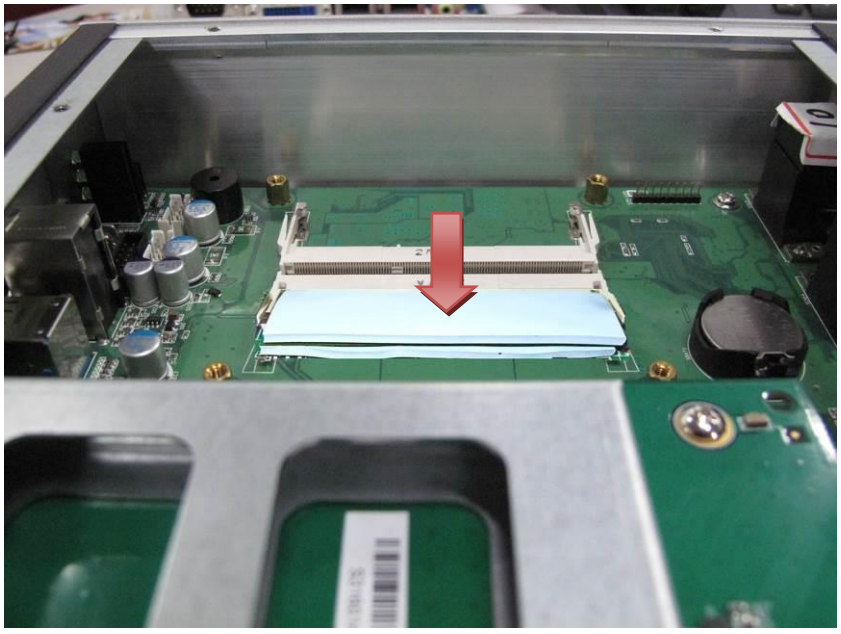
Step 7 Remove transparent plastic Mylar from thermal pad, and stick the thermal pad onto motherboard.



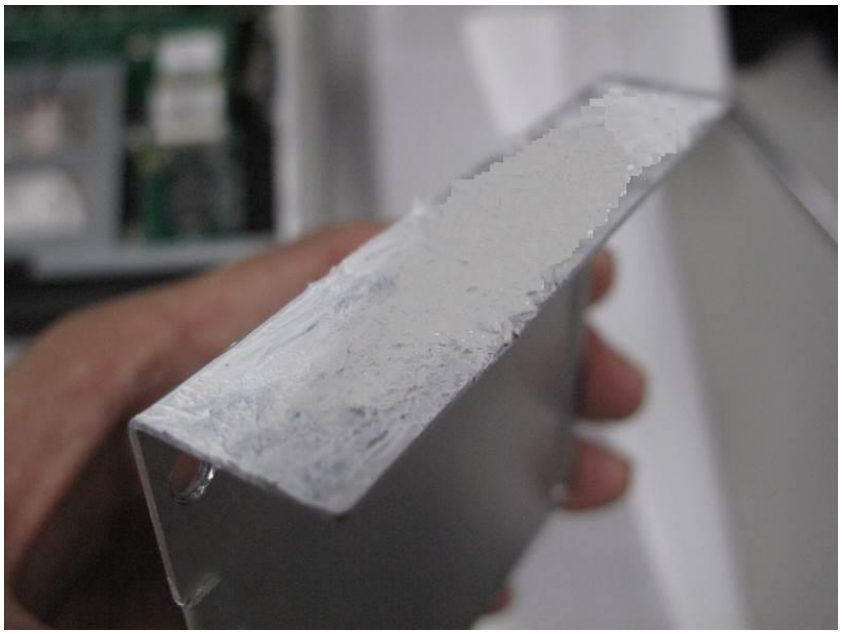
Step 8 **Locate the memory module, insert the gold colored contact into the socket, and push the module down, until it is firmly seated by locking two latches on the sides.**



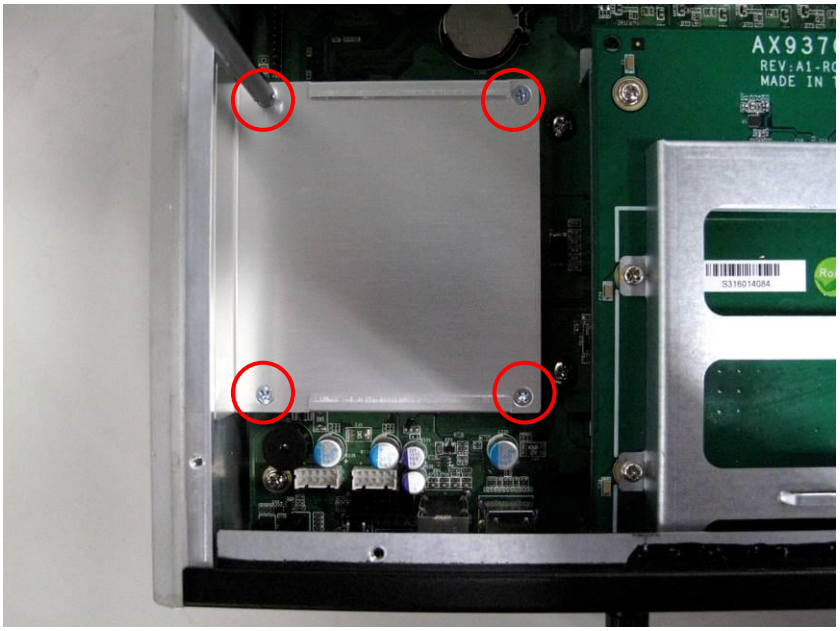
Step 9 **Take 2nd thermal pad, remove the transparent plastic mylar and stick it onto memory.**



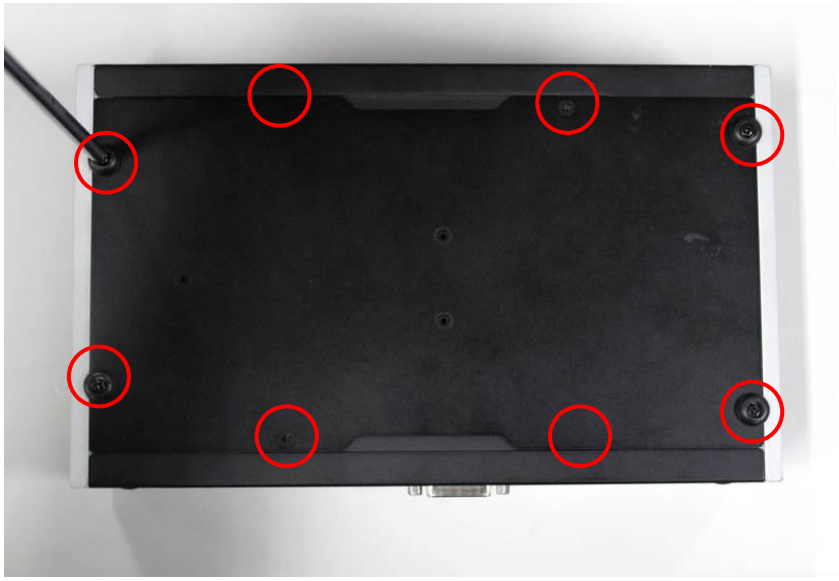
Step 10 Put grease onto the memory bracket



Step 11 Assembly the memory bracket and fasten all screws.



Step 12 Assembly the Top Cover back and fasten all screws.



2.3 Installing the CFast™

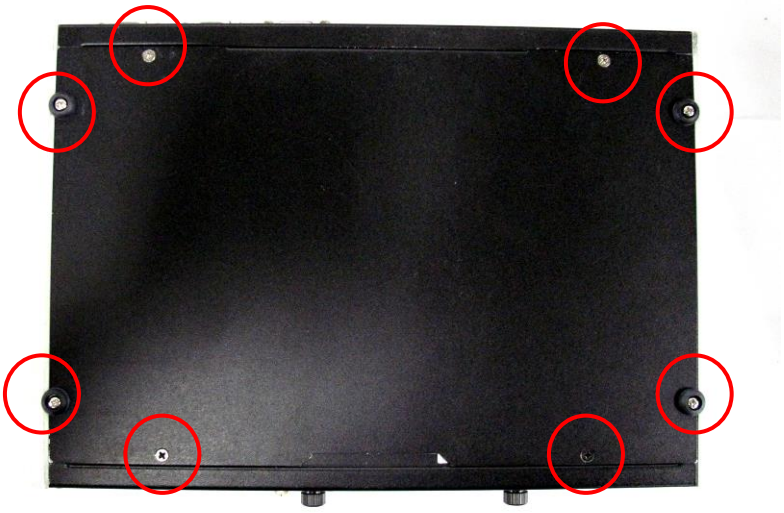
Step 1 Turn off the system, and unplug the power cord.
Step 2 Turn the system to the side with CFast cover.
Step 3 Loosen screws to remove the CFast cover.

Step 4 Slide CFast card into CFast slot with caution.

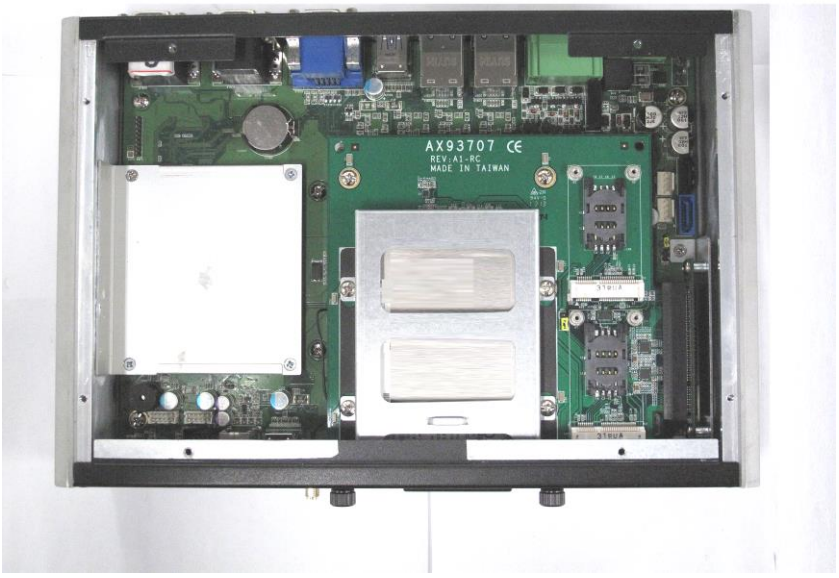
Step 5 Close the cover to the chassis, and fasten all screws.

2.4 Installing the Express Mini Card

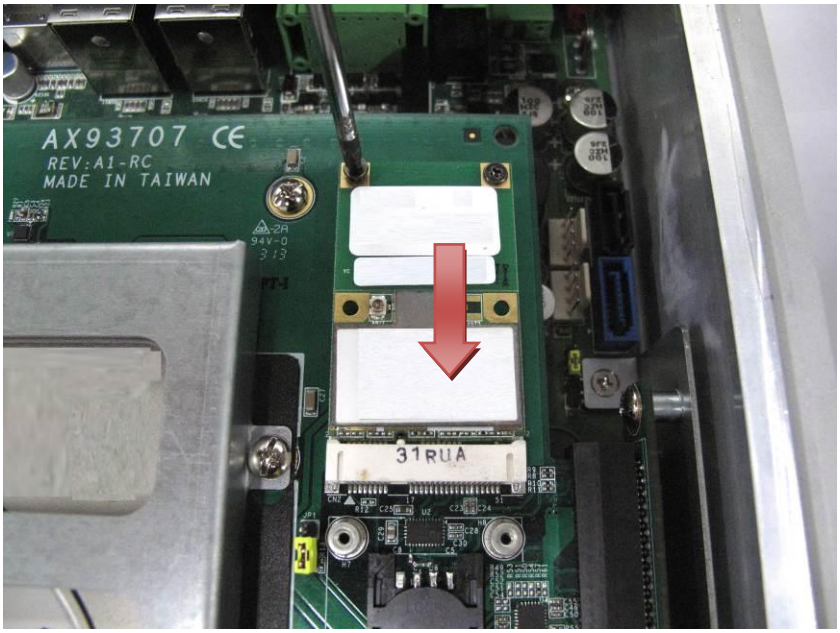
Step 1 Turn off the system, and unplug the power cord.
Step 2 Turn the system upside down to locate screws at the Bottom, loosen screws.



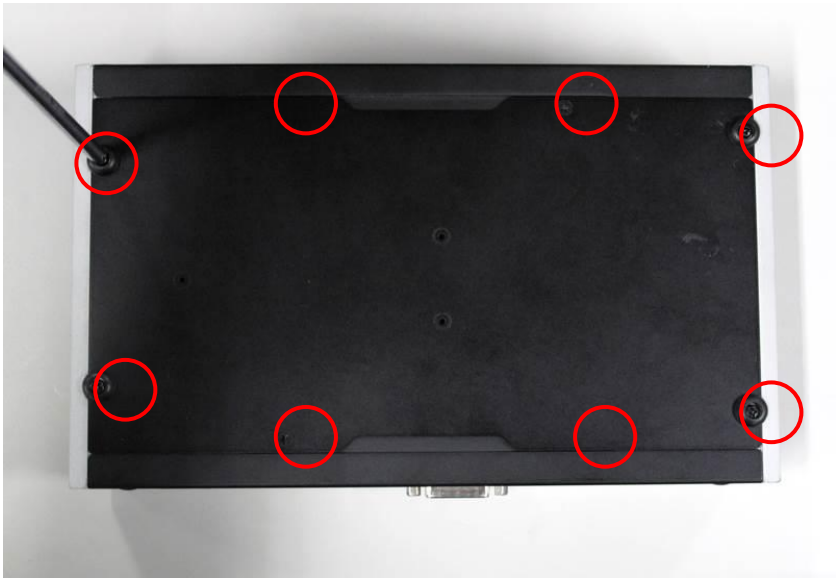
Step 3 Remove the bottom cover to locate the Express Mini Card slot.



Step 4 Slide Mini card into Mini Card slot with caution, and fasten screw of Express Mini Card.



Step 5 Assembly the Top Cover back and fasten all screws.

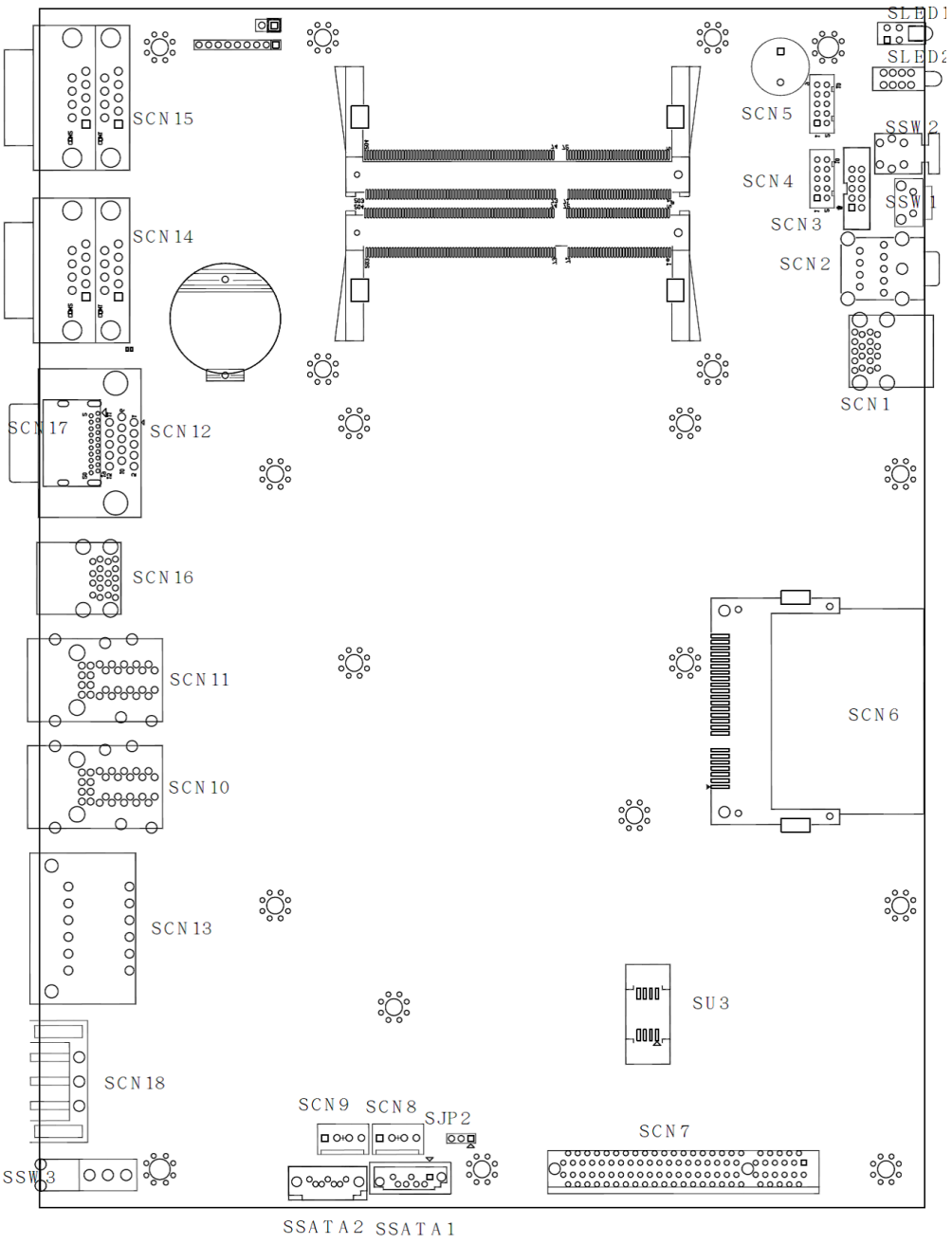


CHAPTER 3
Jumper Setting & Connectors

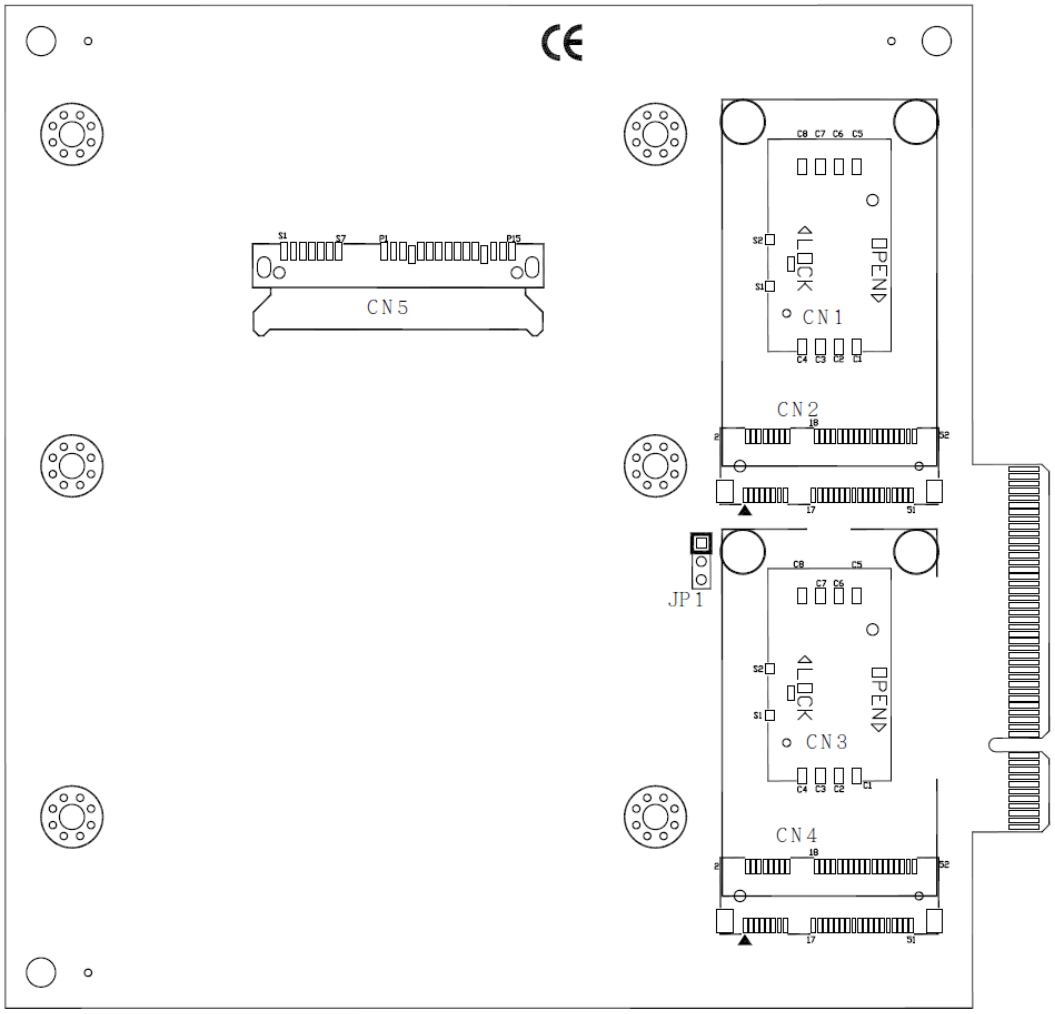
eBOX660-872-FL is a "jumperless" system. Due to all the hardware settings are done via software or firmware, so user doesn't have to configure any setting by jumper, and user doesn't have to open chassis to find out the jumpers. We are herewith listing a summary table of all the I/O connectors.

3.1 SBC Placement

SBC87872



AX93707



NOTE: ***We strongly recommended that you should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instruction might cause system to become damage.***

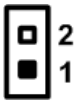
3.2 Jumper Settings and Connectors

Connectors connect the system with other parts/devices. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Below summary table shows you all connectors on the eBOX660-872-FL.

Jumper & Switch Setting	Section
CMOS Clear Jumper	3.2.1
MiniCard / mSATA Setting	3.2.2
External Connectors	**Section**
Wide Range DC Power In Connector	3.2.3
Isolated Digital Input Connector	3.2.4
Isolated Digital Output Connector	3.2.5
VGA Connector	3.2.6
DisplayPort Connector	3.2.7
USB 3.0 Connector	3.2.8
COM1~COM4 Serial Port Connector	3.2.9
Audio Connector	3.2.10
Ethernet Connector	3.2.11
ATX Power On/Off Button	3.2.12
Reset Button	3.2.13
Internal Connectors	**Section**
SATA & SATA Power Connector	3.2.14
CFast™ Socket	3.2.15
SIM Card Slots	3.2.16
Express Mini Card Slot	3.2.17

3.2.1 CMOS Clear Jumper (SJP2 on SBC87872)

Function	Setting
ATX mode	Open
AT mode	Close



3.2.2 MiniCard / mSATA Setting (JP1 on AX93707)

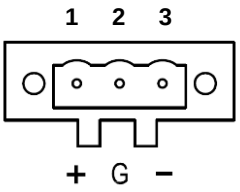
You may need to use this jumper to select mSATA mode or Mini card PCI-E interface

Description	Function	Jumper Setting
mSATA Function Switch	mSATA	
	Normal Mini Card	

3.2.3 Wide Range DC Power In Connector

The system supports a wide range DC 10~30V power in phoenix connector for system power input.

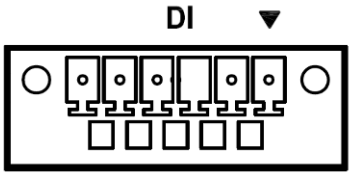
Pin	Signal
1	DC +
2	GND
3	DC -

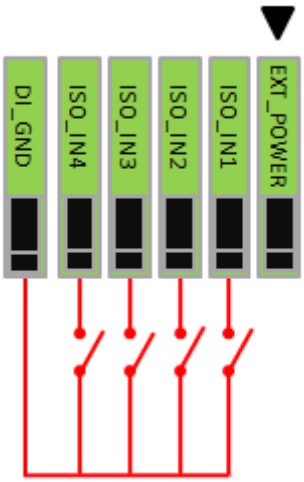
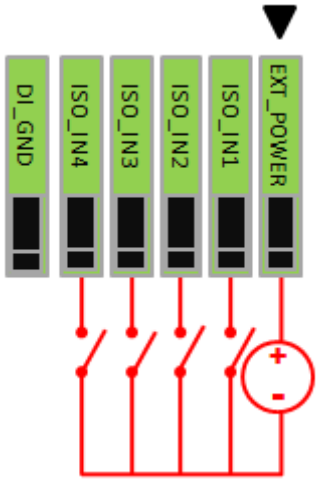


3.2.4 Isolated Digital Input Connector

The system is equipped with an 4-channel digital Input connector that meets requirements for a system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

Pin	Signal
1	EXT_POWER
2	ISO_IN1
3	ISO_IN2
4	ISO_IN3
5	ISO_IN4
6	DI_GND



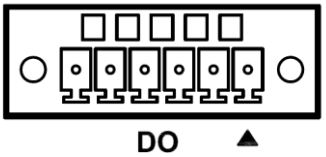
Dry Contact Wiring	Wet Contact Wiring
	

3.2.5 Isolated Digital Output Connector

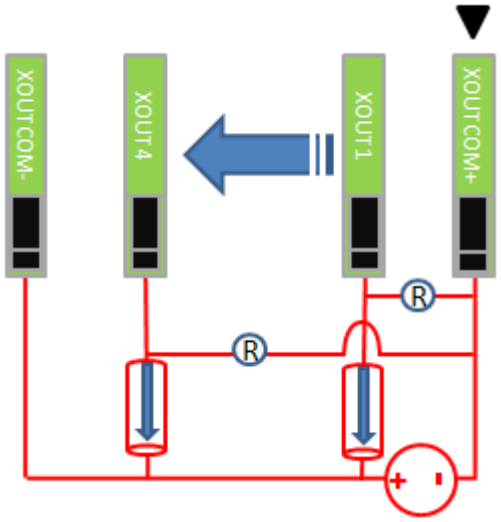
The system is equipped with an 4-channel digital output connector that meets requirements for a system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

Open drains Output, 12V~24V Max sink 200mA.

Pin	Signal
1	XOUTCOM+
2	ISO_OUT1
3	ISO_OUT2
4	ISO_OUT3
5	ISO_OUT4
6	XOUTCOM-



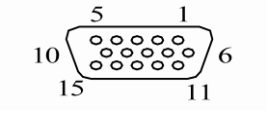
DO Contact Wiring



3.2.6 VGA Connector

The VGA connector is a slim type 15-pin D-Sub connector which is common for the CRT VGA display. The VGA interface configuration can be configured via the software utility.

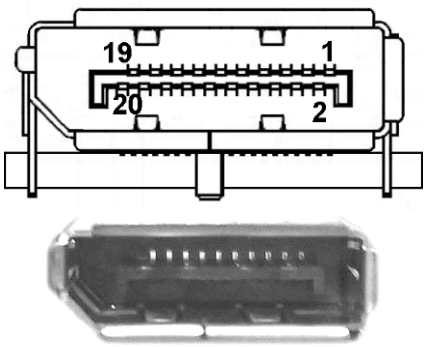
Pin	Signal	Pin	Signal	Pin	Signal
1	Red	2	Green	3	Blue
4	N.C.	5	GND	6	DETECT
7	GND	8	GND	9	VCC
10	GND	11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync	15	DDC CLK



3.2.7 DisplayPort Connector

DisplayPort interface is also called DP port.

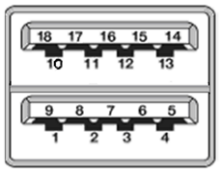
Pin	Signal
1	DPB_LANE0
2	GND
3	DPB_LANE0#
4	DPB_LANE1
5	GND
6	DPB_LANE1#
7	DPB_LANE2
8	GND
9	DPB_LANE2#
10	DPB_LANE3
11	GND
12	DPB_LANE3#
13	Detect Pin
14	GND
15	DPB_AUX
16	GND
17	DPB_AUX#
18	DPB_HPDE
19	GND
20	+3.3V



3.2.8 USB 3.0 Connector

The Universal Serial Bus connectors are compliant with USB 2.0 (480Mbps), and ideally for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin	Signal USB Port 0	Pin	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB_Data2-	11	USB_Data3-
3	USB_Data2+	12	USB_Data3+
4	GND	13	GND
5	SSRX2-	14	SSRX3-
6	SSRX2+	15	SSRX3+
7	GND	16	GND
8	SSTX2-	17	SSTX3-
9	SSTX2+	18	SSTX3+

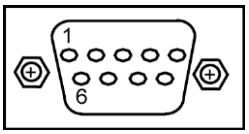


3.2.9 COM1~COM4 Serial Port Connector

The system has eight serial ports. COM1~COM4 are RS-232/422/485 ports. Please refer to Chapter 3 for the setting.

Pin	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use

COM1~COM4



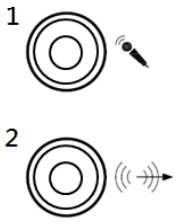
Before using RS-422/485, please have to set the Transfer Protocol as 8-N-2 (Data 8bit, parity 1bit [no parity], stop bit 2bit). Or user can set the parity bit as Odd Parity Check or Even Parity Check, and stop bit as 1bit.

.

3.2.10 Audio Connector

These two audio jacks ideal are for Audio Mic-In and Audio Line-out.

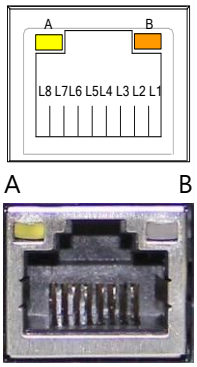
Pin	Signal
1	Microphone In
2	Line Out



3.2.11 Ethernet Connector (LAN1~LAN4)

The RJ-45 connector is for Ethernet. To connect the board to a 1000/100/10 Base-T hub, just plug one end of the cable into connector and connect the other end (phone jack) to a 1000/100/10-Base-T hub

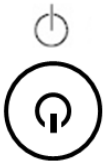
Pin	Signal	Pin	Signal
L1	MDI0+	L5	MDI2-
L2	MDI0-	L6	MDI1-
L3	MDI1+	L7	MDI3+
L4	MDI2+	L8	MDI3-
A	Active LED (Yellow)		
B	100 LAN LED (Green)/ 1000 LAN LED (Orange)		



3.2.12 ATX Power On/OFF Button

The ATX power button is on the I/O side. It can allow users to control eBOX660-872-FL power on/off.

Function	Description
On	Turn on/off system
Off	Keep system status



3.2.13 Reset Button

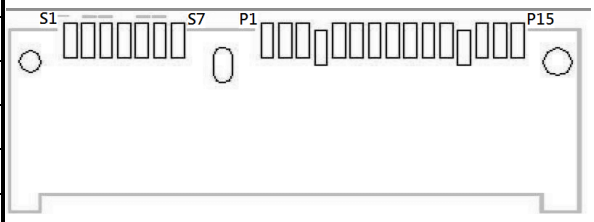
The Reset button can allow users to reset eBOX660-872-FL.

Function	Description
On	Reset system
Off	Keep system status

3.2.14 SATA & SATA Power Connector

The SATA connector is for high-speed SATA interface ports and they can be connected to hard disk devices.

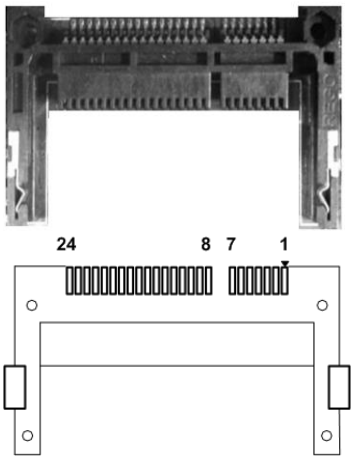
Pin	SATA Signal	Pin	Power Signal
S1	GND	P1	+3.3V
S2	SATA_TX+	P2	+3.3V
S3	SATA_TX-	P3	+3.3V
S4	GND	P4	GND
S5	SATA_RX-	P5	GND
S6	SATA_RX+	P6	GND
S7	GND	P7	+5V
		P8	+5V
		P9	+5V
		P10	GND
		P11	GND
		P12	GND
		P13	NC
		P14	NC
		P15	NC



3.2.15 CFast™ Socket

The system is equipped with a CFast™ socket on the bottom side to support a CFast™ card which is based on the Serial ATA bus. The socket is specially designed to avoid incorrect installation of the CFast™ card. When installing or removing the CFast™ card, please make sure the system power is off. The CFast™ card by default identifies itself as C: or D: drive in your PC system.

Pin	Signal	Pin	Signal
1	GND	13	N.C
2	SATA_TX+	14	GND
3	SATA_TX-	15	N.C
4	GND	16	CFAST_LED#
5	SATA_RX-	17	N.C
6	SATA_RX+	18	N.C
7	GND	19	N.C
8	N.C	20	+3.3V Level
9	GND	21	+3.3V Level
10	N.C	22	GND
11	N.C	23	GND
12	N.C	24	N.C



3.3.16 SIM Card Slots

eBOX660-872-FL includes two SIM slots on the bottom side of the system for inserting SIM Card. It is mainly used in 3G wireless network application.

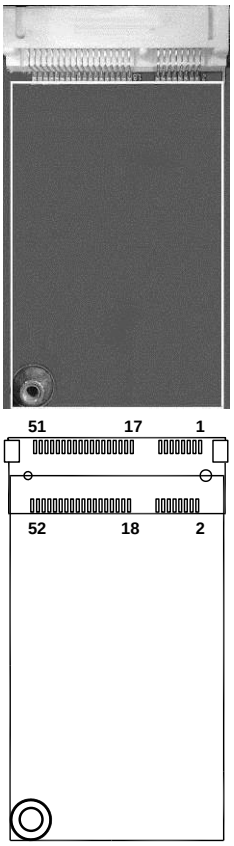
Pin	Signal
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC

3.2.17 Express Mini Card Slot

PCI Express Mini Card connector supports a PCI Express x1 link and a USB 2.0 link. A PCI Express Mini Card can be applied to either PCI Express or USB 2.0. It complies with PCI-Express Mini Card Spec. V1.2.

The USB 2.0 support will be helpful during the transition to PCI Express, because peripheral vendors will need time to design their chipsets to have the PCI Express function. During the transition, PCI Express Mini Cards can be quickly implemented by using USB 2.0.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3	24	+3.3VSB
25	PE_RXP3	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3	32	SMB_DATA
33	PE_TXP3	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB



CHAPTER 4
AMI BIOS SETUP UTILITY

The AMI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a battery-backed CMOS to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

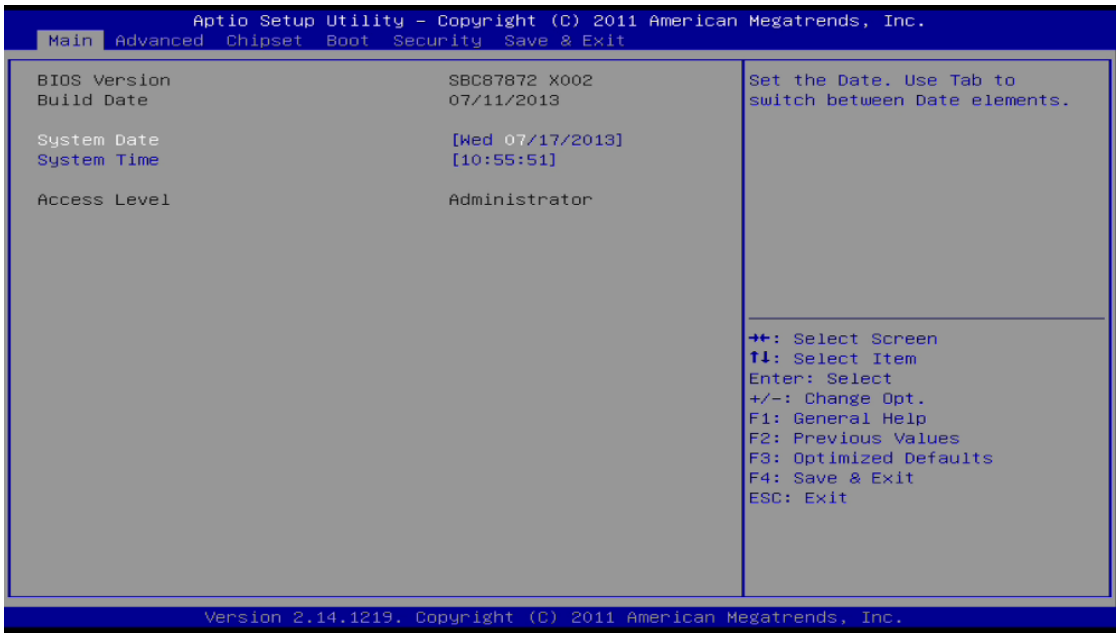
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

NOTE: Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



- **System Date/Time**

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

4.4 Advanced Menu

Launch PXE OpROM

Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.

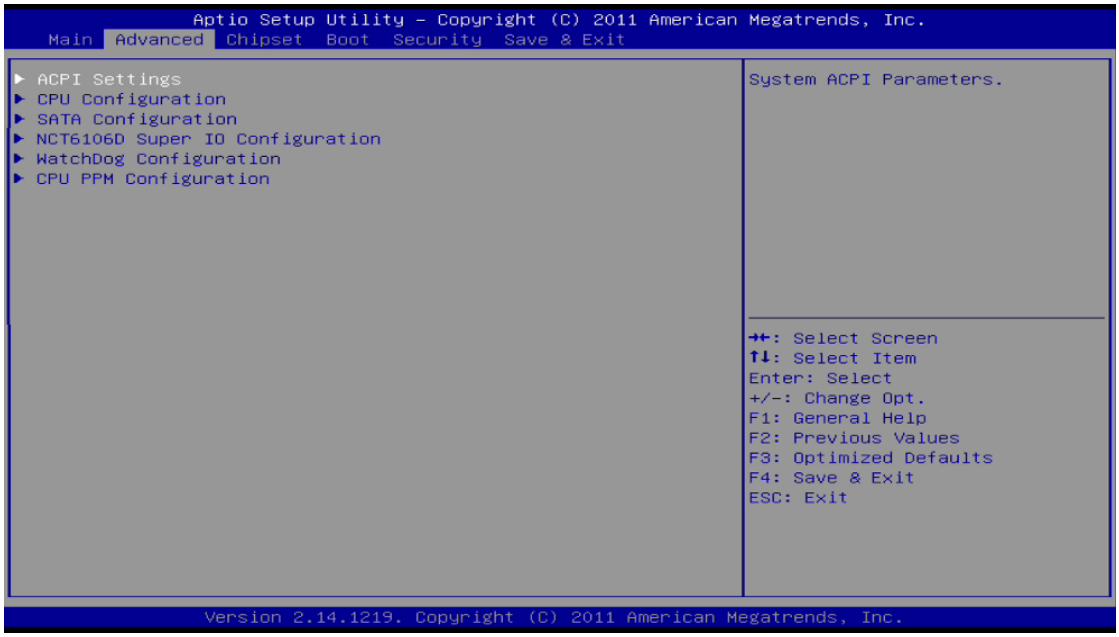
Launch Storage OpROM

This item can enable or disable boot option for legacy mass storage devices with option ROM.

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

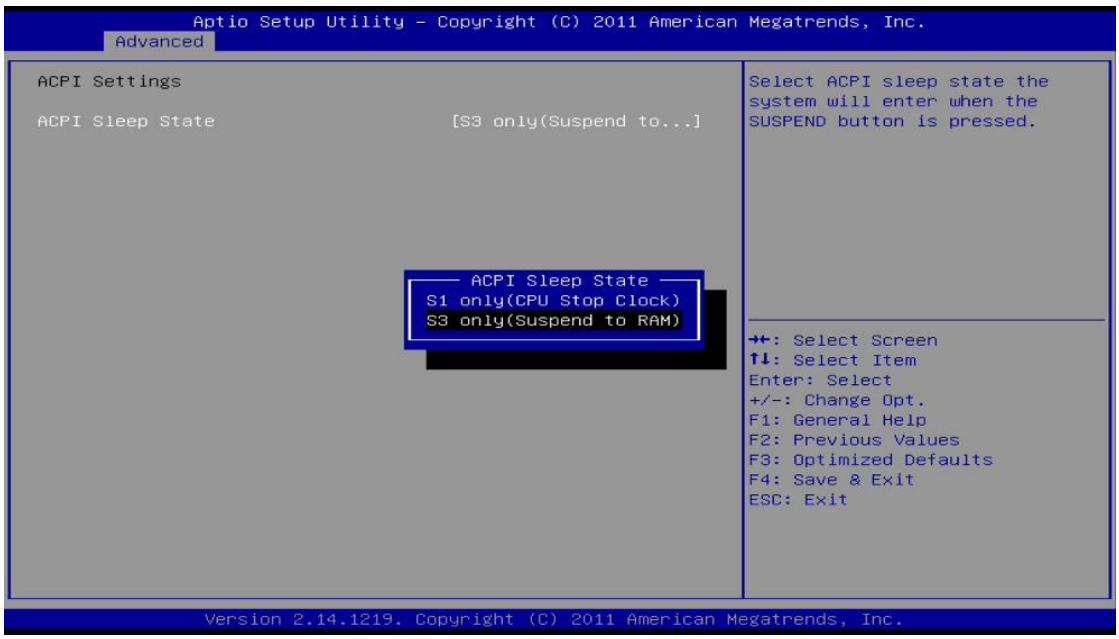
- ► ACPI Settings
- ► CPU Configuration
- ► SATA Configuration
- ► NCT6106D Super IO Configuration
- ► Watchdog Configuration
- ► CPU PPM Configuration

For items marked with "►", please press <Enter> for more options.



- **ACPI Settings**

You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

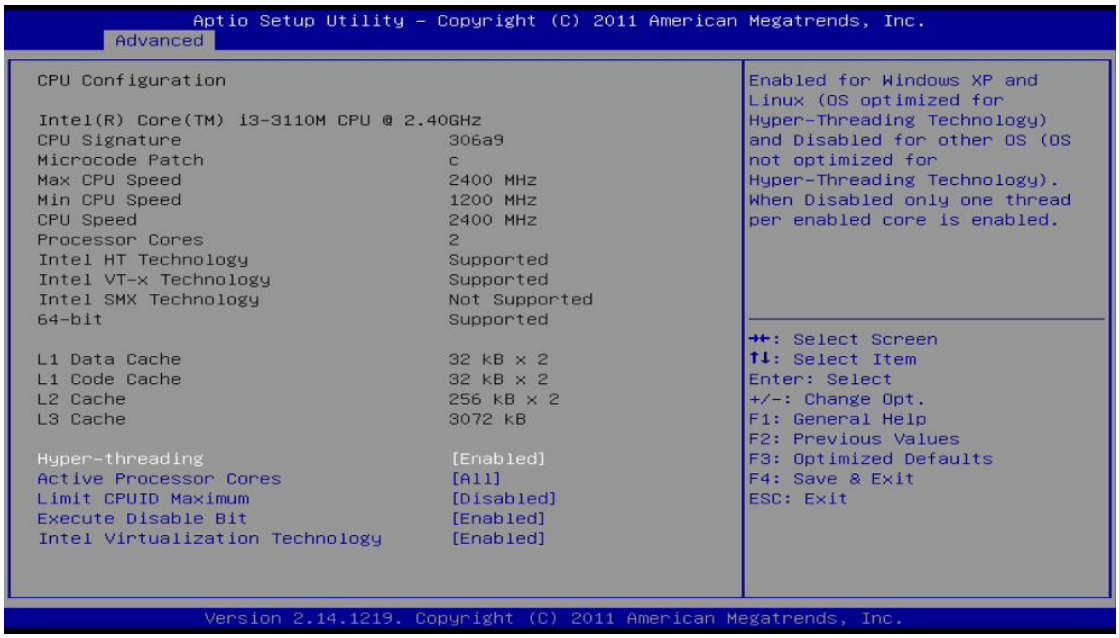

Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
ACPI Settings
ACPI Sleep State
[S3 only(Suspend to...]
Select ACPI sleep state the system will enter when the SUSPEND button is pressed.
ACPI Sleep State
S1 only(CPU Stop Clock)
S3 only(Suspend to RAM)
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

- **ACPI Sleep State**

Allow you to select the Advanced Configuration and Power Interface (ACPI) sleep state. Here are the options for your selection: S1 (CPU Stop Clock) and S3 (Suspend to RAM). The S3 (Suspend to RAM) option selects the highest ACPI sleep state the system will enter when SUSPEND button is pressed.

- **CPU Configuration**

This screen shows the CPU Configuration, and you can change the value of the selected option.


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
CPU Configuration
Intel(R) Core(TM) i3-3110M CPU @ 2.40GHz
CPU Signature 306a9
Microcode Patch c
Max CPU Speed 2400 MHz
Min CPU Speed 1200 MHz
CPU Speed 2400 MHz
Processor Cores 2
Intel HT Technology Supported
Intel VT-x Technology Supported
Intel SMX Technology Not Supported
64-bit Supported
L1 Data Cache 32 kB x 2
L1 Code Cache 32 kB x 2
L2 Cache 256 kB x 2
L3 Cache 3072 kB
Hyper-threading [Enabled]
Active Processor Cores [All]
Limit CPUID Maximum [Disabled]
Execute Disable Bit [Enabled]
Intel Virtualization Technology [Enabled]
Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Hyper-threading

Enabled for Windows XP and Linux and disabled for other OS which do not optimized for Hyper-threating technology.

Active Processor Cores

Number of cores to enable in each processor package.

Limit CPUID Maximum

Set limit CPUID Maximum value. Should be set as "disabled" for Windows XP.

Execute Disable Bit

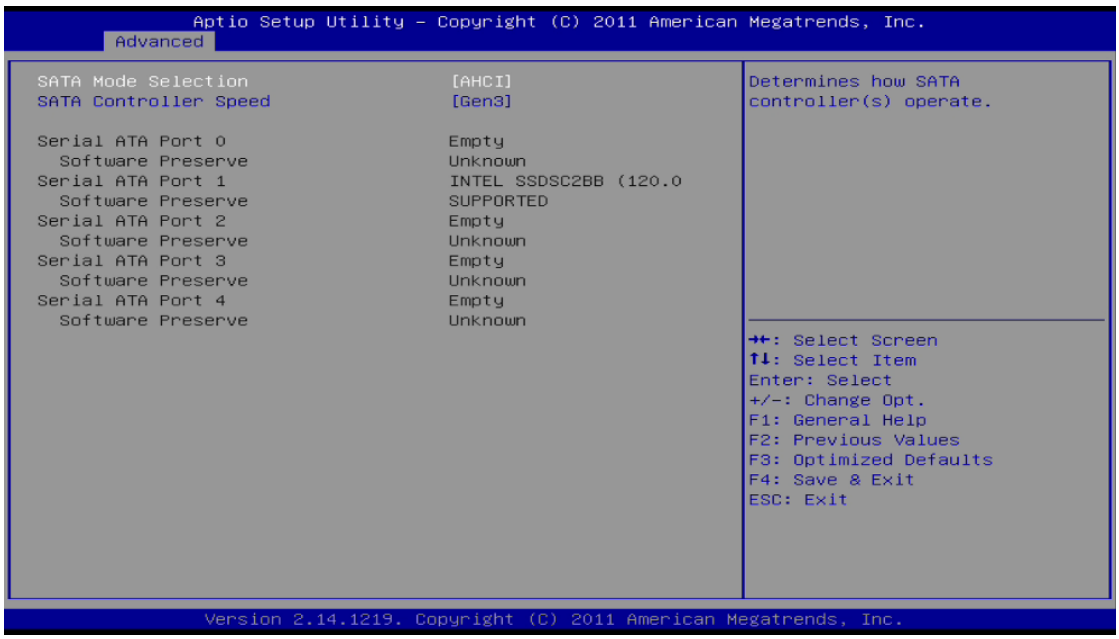
No-Execution page protection technology is able to force the XD feature flag to always return 0.

Intel Virtualization Technology

Allow you to enable or disable Intel Virtualization Technology. When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology .

- **SATA Configuration**

In the SATA Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
SATA Mode Selection [AHCI]
SATA Controller Speed [Gen3]
Serial ATA Port 0 Empty
Software Preserve Unknown
Serial ATA Port 1 INTEL SSDSC2BB (120.0
Software Preserve SUPPORTED
Serial ATA Port 2 Empty
Software Preserve Unknown
Serial ATA Port 3 Empty
Software Preserve Unknown
Serial ATA Port 4 Empty
Software Preserve Unknown
Determines how SATA controller(s) operate.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

SATA Mode Selection

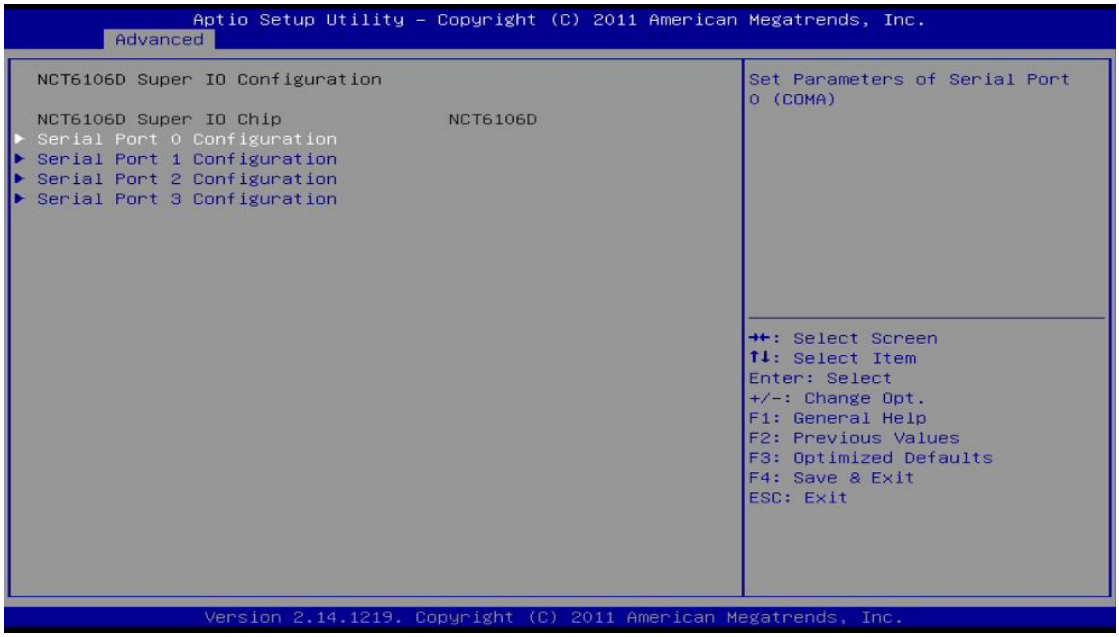
Use this item to choose the SATA operation mode. Here are the options for your selection: IDE Mode and AHCI Mode.

SATA Controller Speed

Use this item to choose the SATA speed. Here are the options for your selection: Gen1, Gen2, Gen3

- **NCT6106D Super IO Configuration**

You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
NCT6106D Super IO Configuration
NCT6106D Super IO Chip NCT6106D
Serial Port 0 Configuration
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Set Parameters of Serial Port 0 (COMA)
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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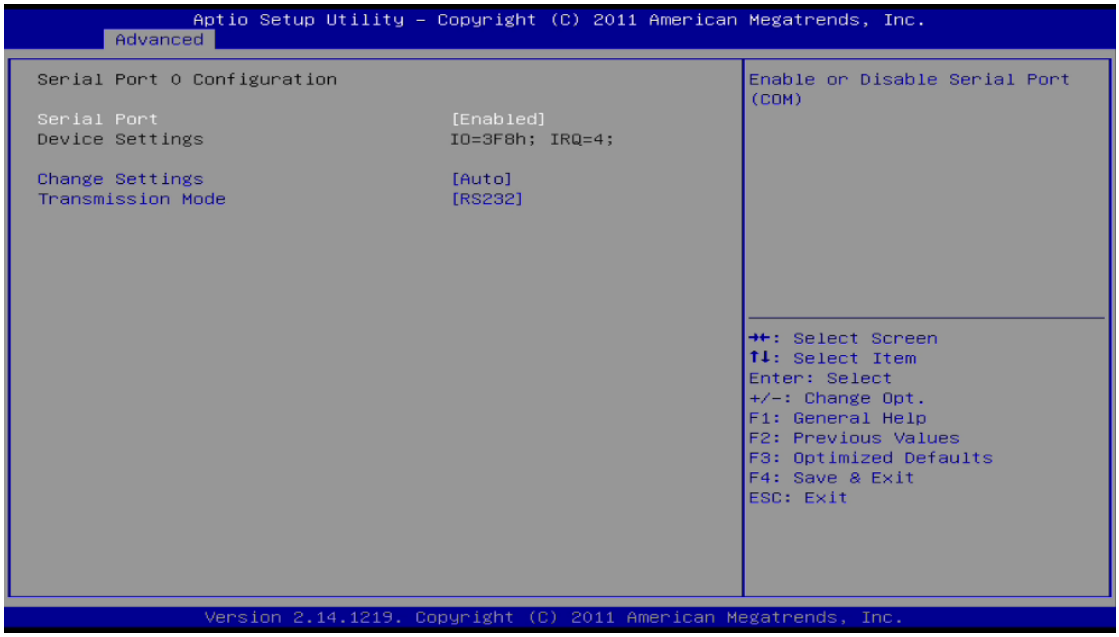
- **Serial Port 0 Configuration**



Serial Port

Use this item to enable or disable serial port 0. The optimal setting for base I/O address is 3F8h and for interrupt request line is IRQ4.

Change Settings

Here are the options for your selection;

Auto;

IO=3F8h; IRQ=4;

IO=3F8h; IRQ=3,4,5,6,7,10,11,12;

IO=2F8h; IRQ=3,4,5,6,7,10,11,12;

IO=3E8h; IRQ=3,4,5,6,7,10,11,12;

IO=2E8h; IRQ=3,4,5,6,7,10,11,12;

Transmission Mode

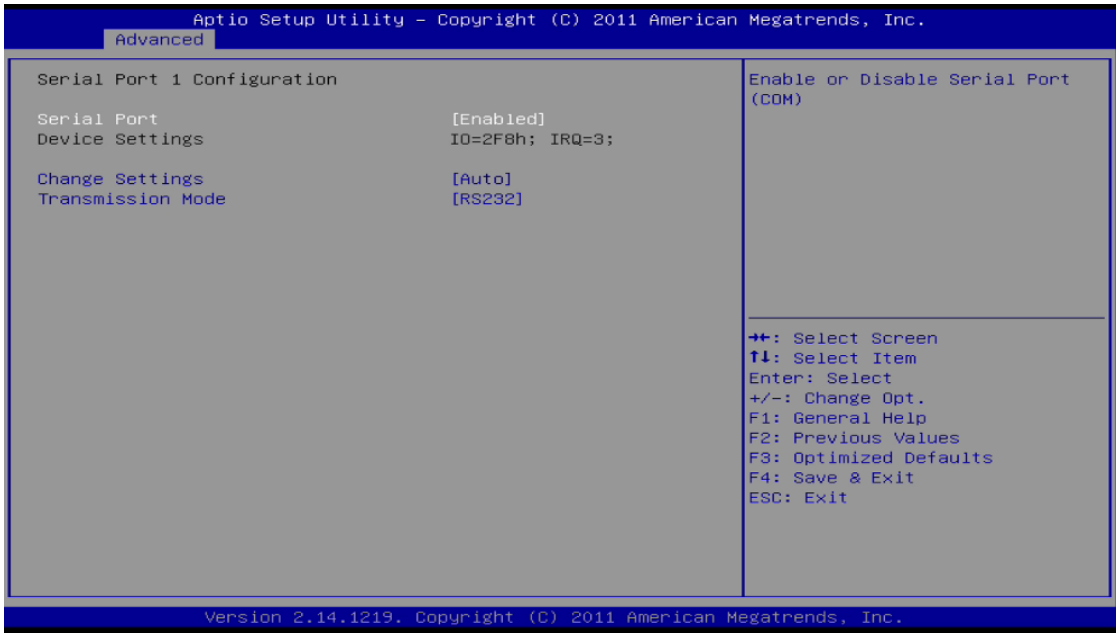
Use this item to configure serial port 0. Here are the options for your selection:

RS232

RS422

RS485

- **Serial Port 1 Configuration**



Serial Port

Use this item to enable or disable serial port 1. The optimal setting for base I/O address is 2F8h and for interrupt request line is IRQ3.

Change Settings

Here are the options for your selection;

Auto;

IO=2F8h; IRQ=3;

IO=3F8h; IRQ=3,4,5,6,7,10,11,12;

IO=2F8h; IRQ=3,4,5,6,7,10,11,12;

IO=3E8h; IRQ=3,4,5,6,7,10,11,12;

IO=2E8h; IRQ=3,4,5,6,7,10,11,12;

Transmission Mode

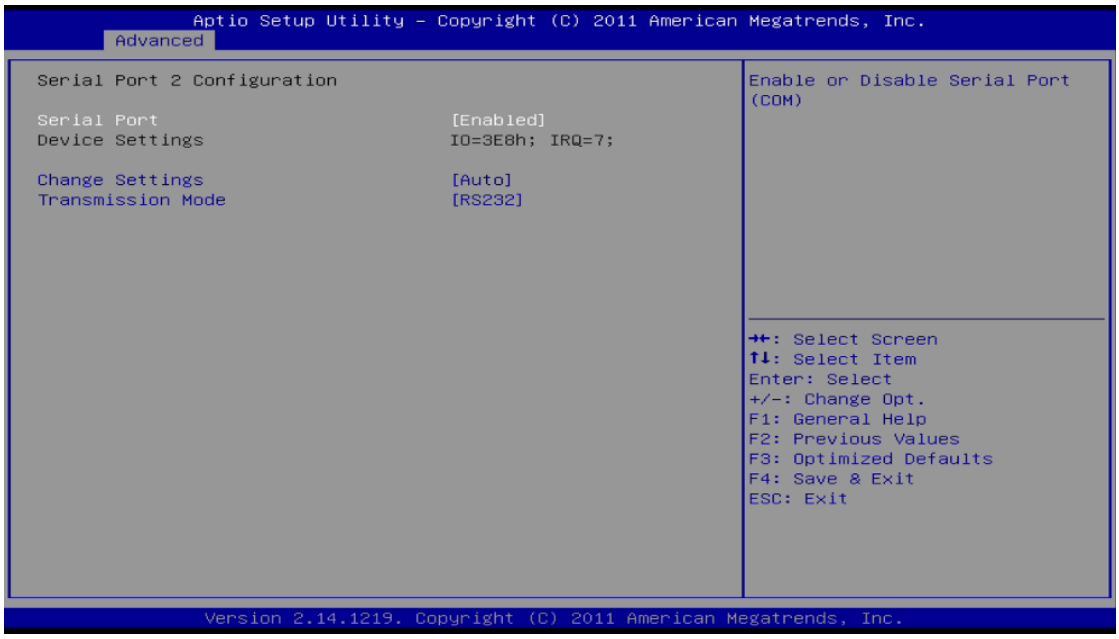
Use this item to configure serial port 0. Here are the options for your selection:

RS232

RS422

RS485.

- **Serial Port 2 Configuration**



Serial Port

Use this item to enable or disable serial port 2. The optimal setting for base I/O address is 3E8h and for interrupt request line is IRQ7.

Change Settings

Here are the options for your selection;

Auto;

IO=3E8h; IRQ=7;

IO=3E8h; IRQ=3,4,5,6,7,10,11,12;

IO=2E8h; IRQ=3,4,5,6,7,10,11,12;

IO=2E0h; IRQ=3,4,5,6,7,10,11,12;

IO=2F0h; IRQ=3,4,5,6,7,10,11,12;

Transmission Mode

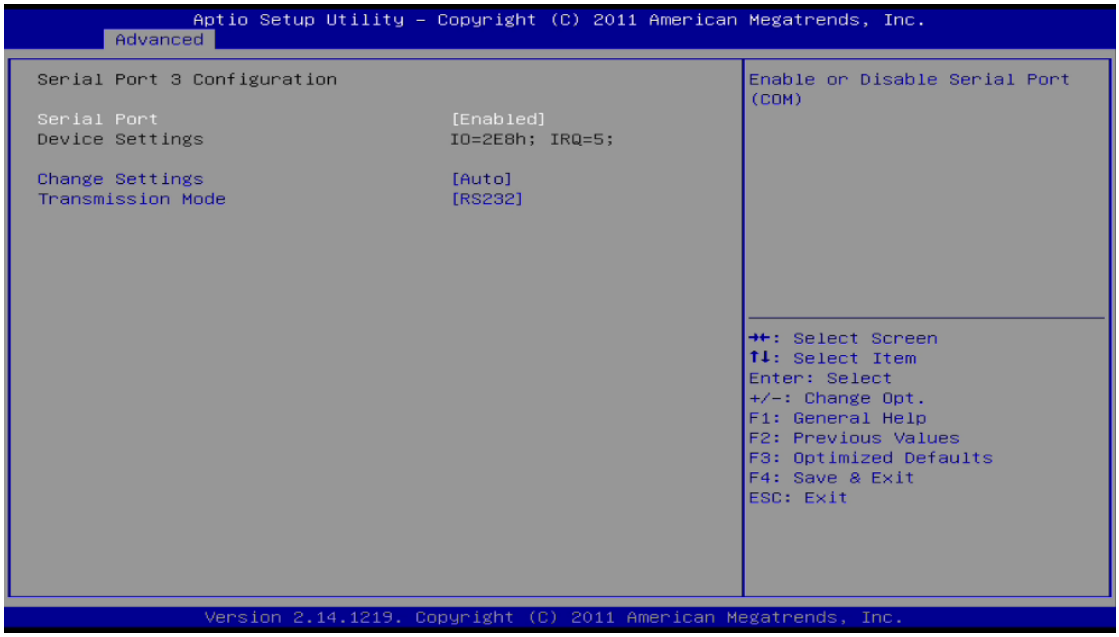
Use this item to configure serial port 0. Here are the options for your selection:

RS232

RS422

RS485.

- **Serial Port 3 Configuration**



Serial Port

Use this item to enable or disable serial port 3. The optimal setting for base I/O address is 2E8h and for interrupt request line is IRQ5.

Change Settings

Here are the options for your selection;

Auto;

IO=3E8h; IRQ=7;

IO=3E8h; IRQ=3,4,5,6,7,10,11,12;

IO=2E8h; IRQ=3,4,5,6,7,10,11,12;

IO=2E0h; IRQ=3,4,5,6,7,10,11,12;

IO=2F0h; IRQ=3,4,5,6,7,10,11,12;

Transmission Mode

Use this item to configure serial port 0. Here are the options for your selection:

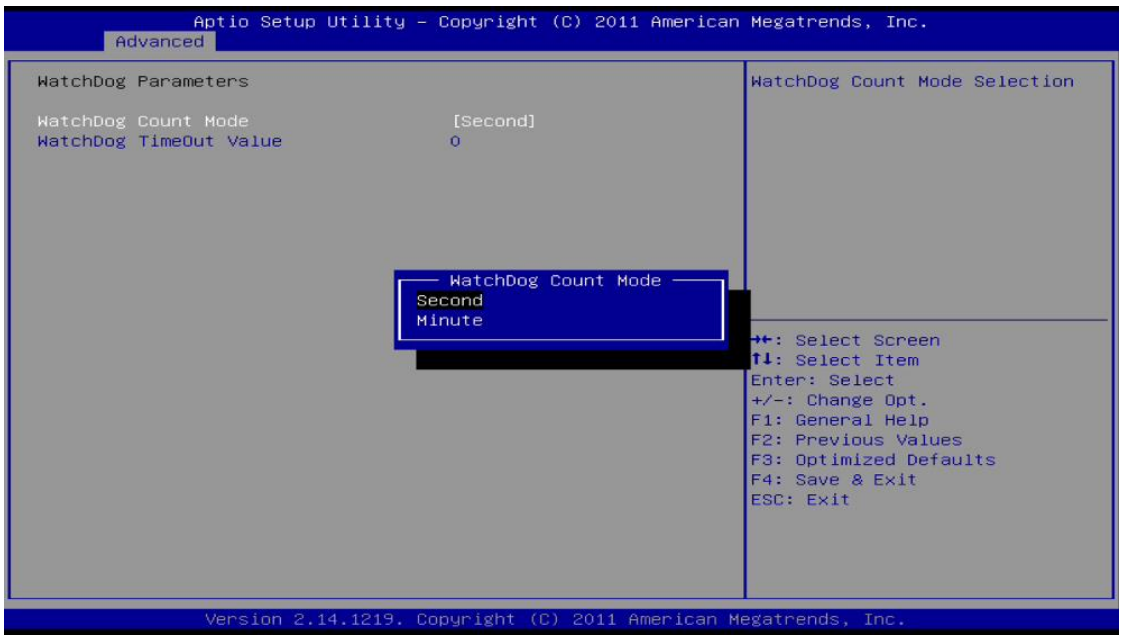
RS232

RS422

RS485.

- **WatchDog Parameters**

You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



WatchDog Count Mode

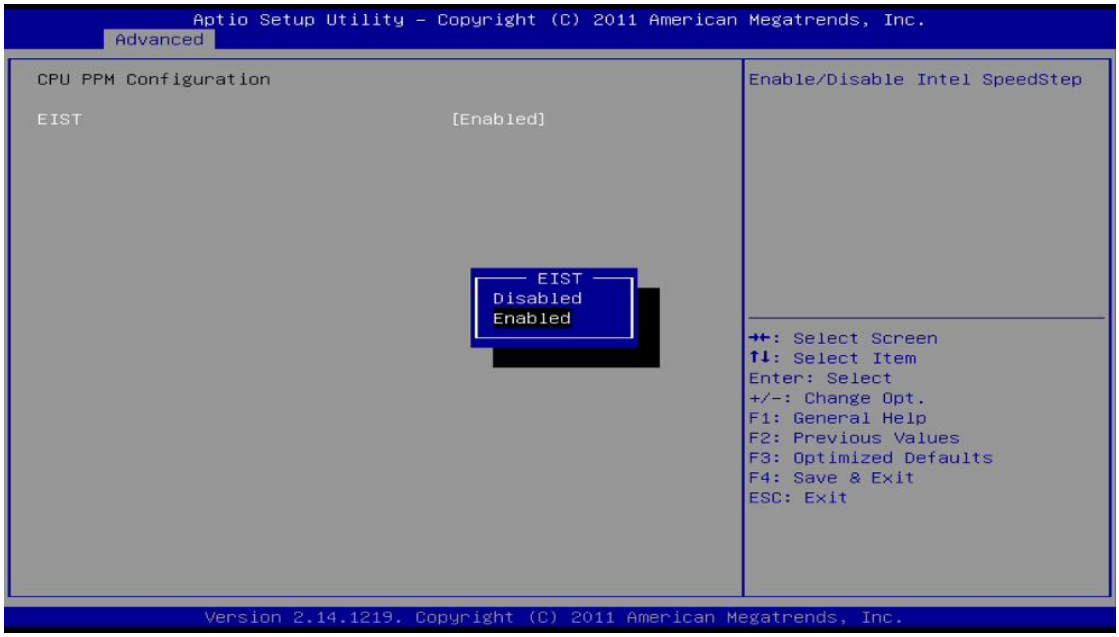
Allow you to select the WatchDog Count mode. Here are the options for your selection: Second and Minute.

WatchDog TimeOut Value

Allow you to set the WatchDog Time out value.

- **CPU PPM Configuration**

You can use this screen to select options for the CPU PPM configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. EIST is Enhanced Intel® SpeedStep® Technology.

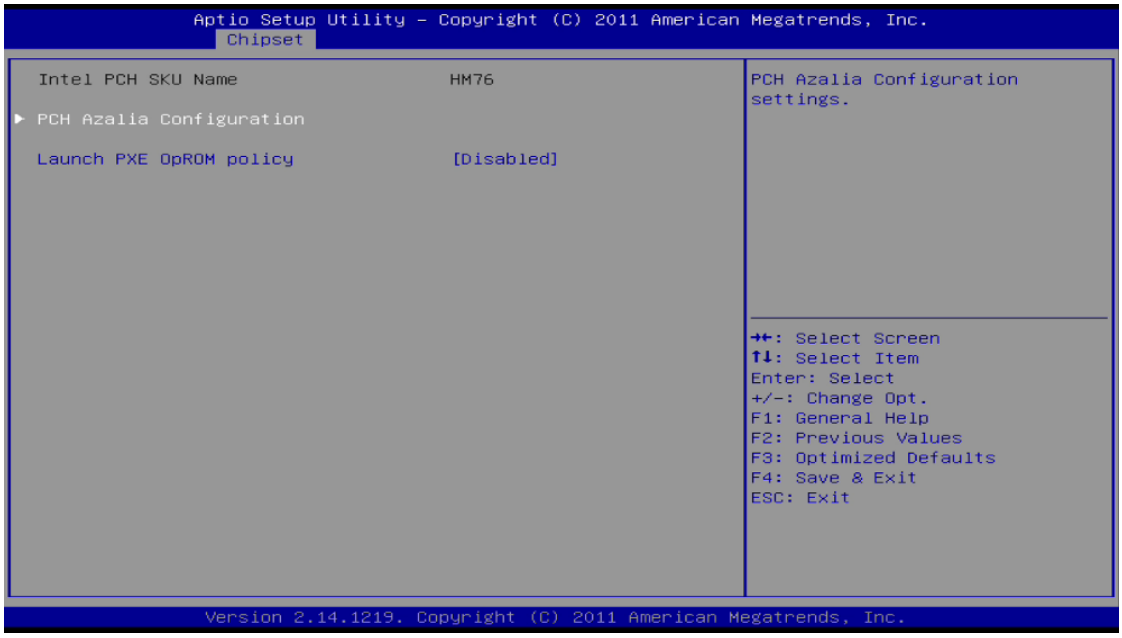


4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

► PCH Azalia Configuration
► Launch PXE OpROM policy

For items marked with "►", please press <Enter> for more options.

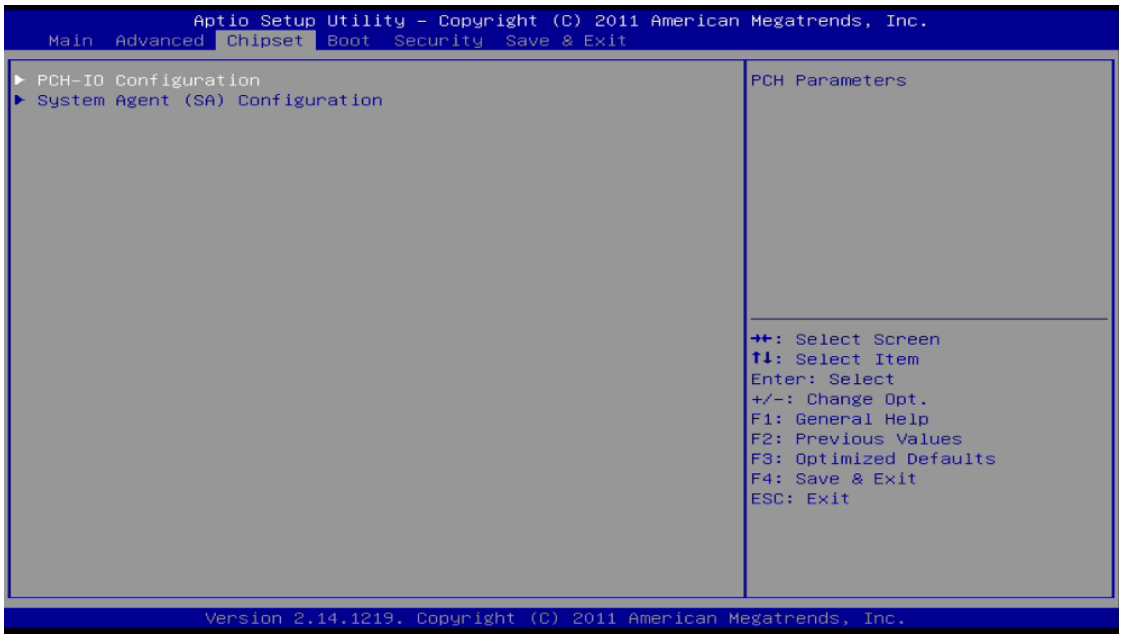


- **Launch PXE OpROM policy**

Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up. Here are the options for your selection: Disabled and Enabled.

- **PCH Azalia Configuration**

This screen allows users to configure PCH Azalia Configuration parameters. For items marked with "►", please press <Enter> for more options.


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
PCH-IO Configuration
System Agent (SA) Configuration
PCH Parameters
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

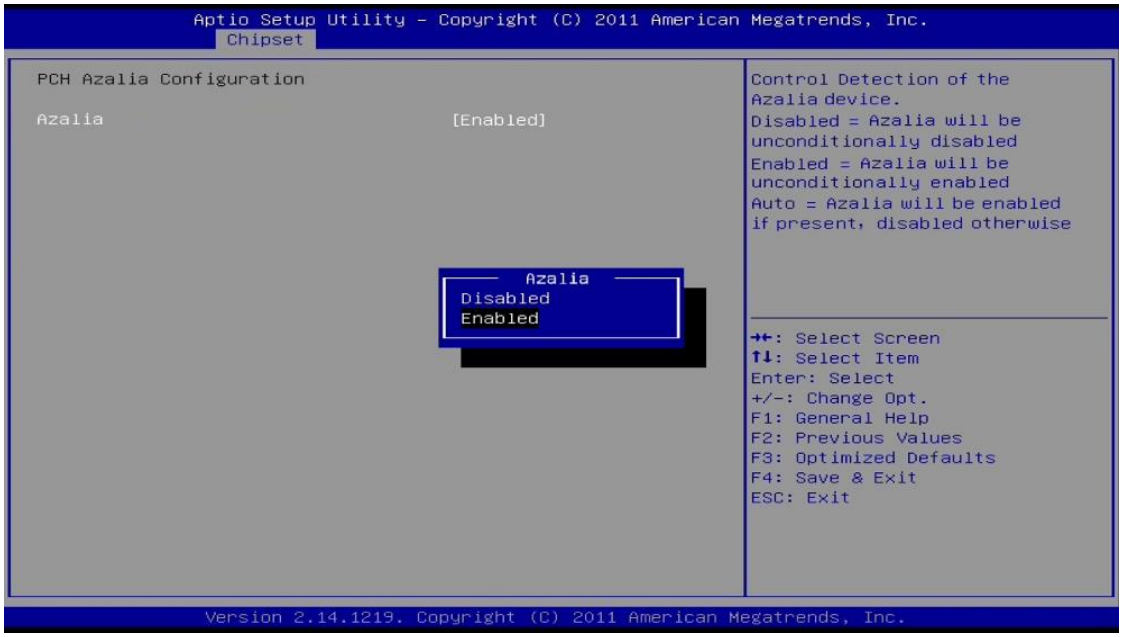
PCH-IO Configuration

Use this item for further setting of PCH I/O configuration.

System Agent (SA) Configuration

Use this item for further setting of System Agent configuration.

- **PCH-IO Configuration**

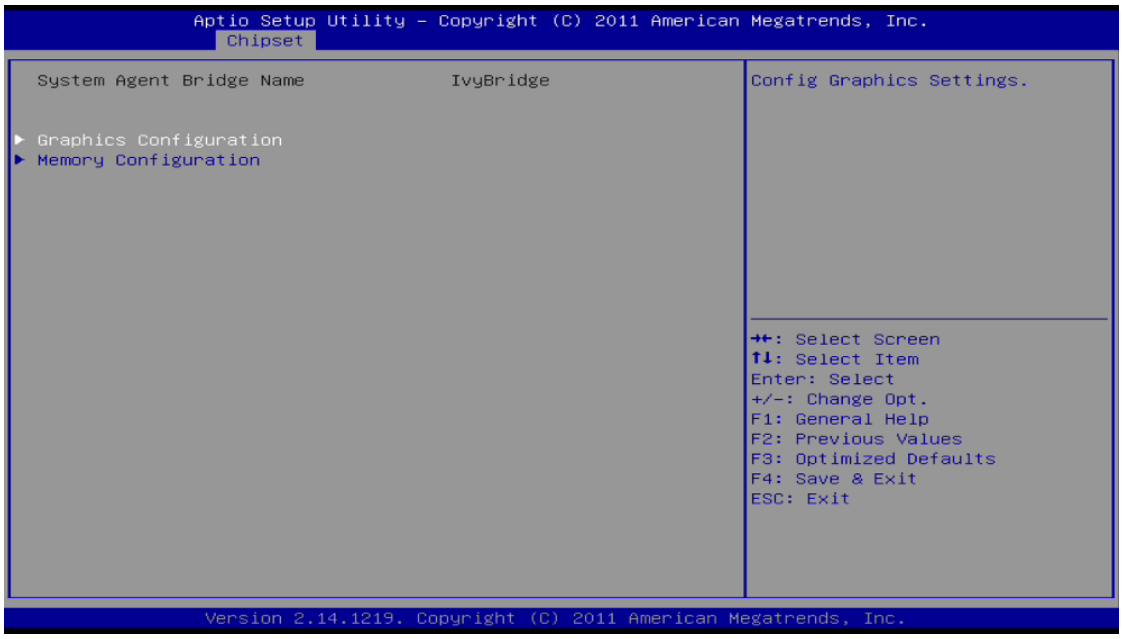

Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Chipset
PCH Azalia Configuration
Azalia [Enabled]
Control Detection of the Azalia device.
Disabled = Azalia will be unconditionally disabled
Enabled = Azalia will be unconditionally enabled
Auto = Azalia will be enabled if present, disabled otherwise
Azalia
Disabled
Enabled
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Azalia

This item allows you to select Azalia Audio control options. Here are the options for your selection: Disabled and Enabled.

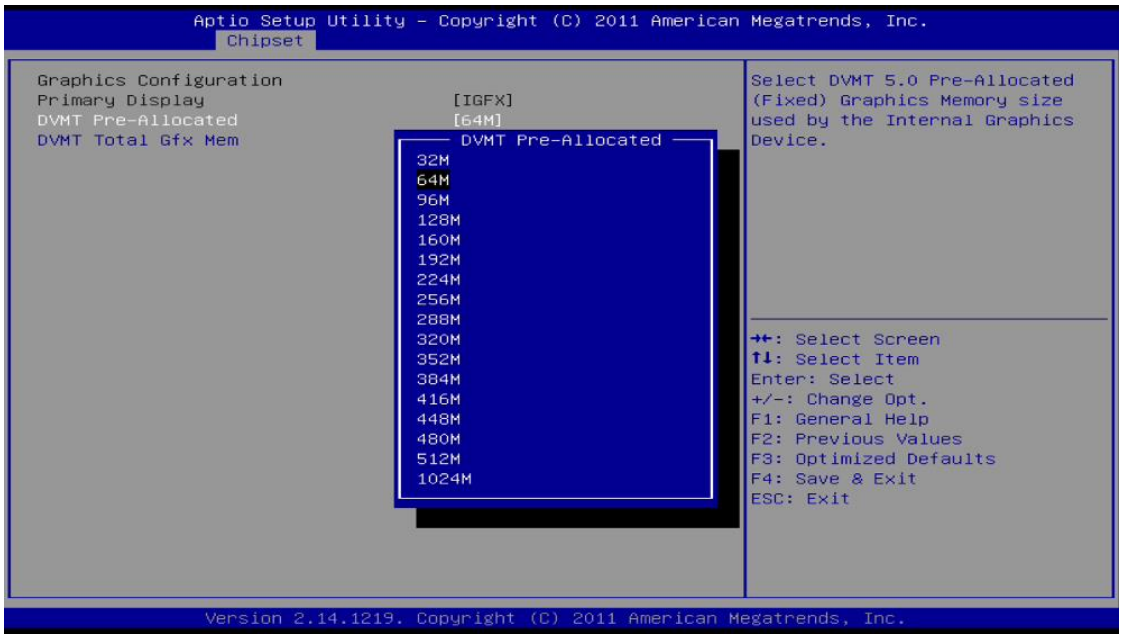
- **System Agent (SA) Configuration**

This screen allows users to configure System Agent (SA) parameters. For items marked with "▶", please press <Enter> for more options.



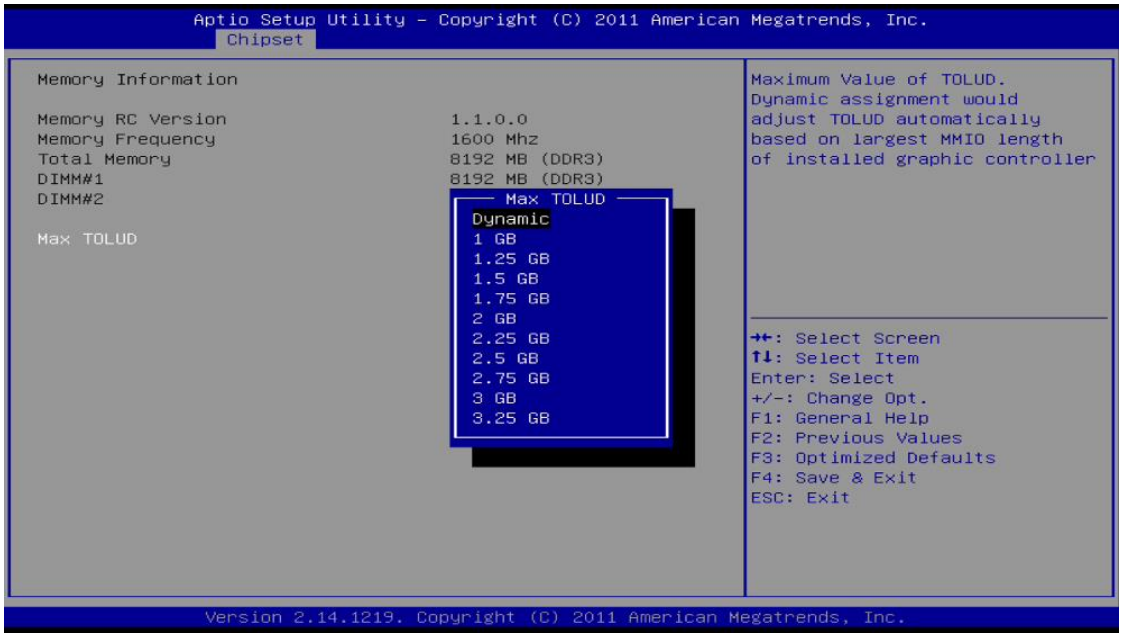
Graphics Configuration

Use this item for further setting of graphics configuration.



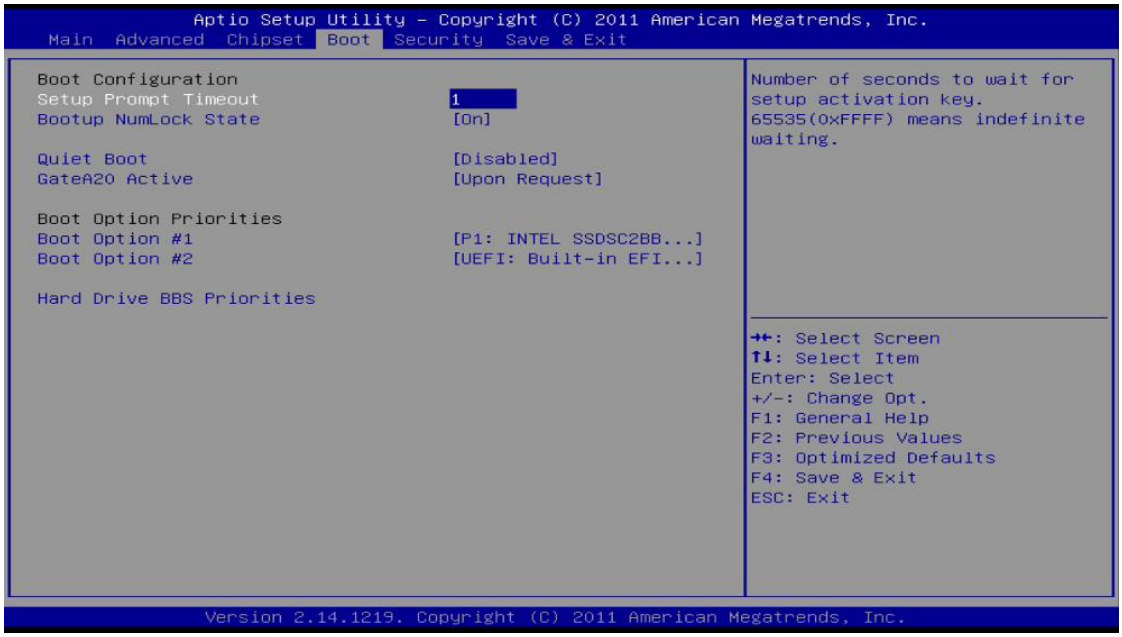
Memory Configuration

This screen displays memory information, and allows user to set memory configuration.



4.6 Boot Menu

The Boot menu allows users to change boot options of the system.



- **Setup Prompt Timeout**

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

- **Bootup NumLock State**

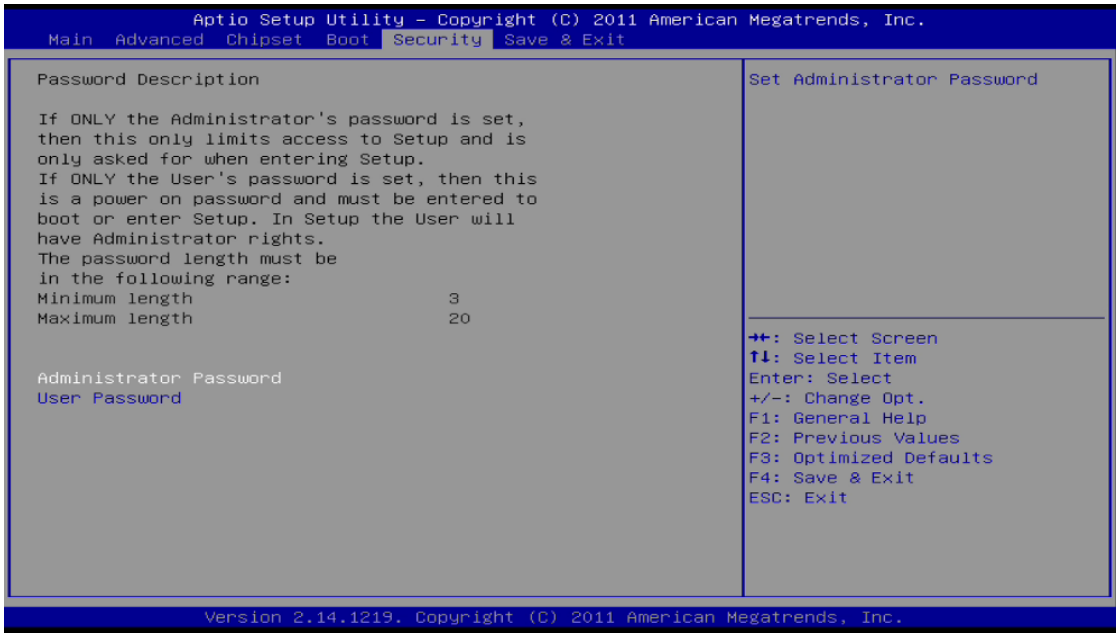
Use this item to select the power-on state for the NumLock.

- **Quiet Boot**

Enable or disable Quiet Boot option.

4.7 Security Menu

The Security menu allows users to change the security settings for the system.


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
Password Description
If ONLY the Administrator's password is set,
then this only limits access to Setup and is
only asked for when entering Setup.
If ONLY the User's password is set, then this
is a power on password and must be entered to
boot or enter Setup. In Setup the User will
have Administrator rights.
The password length must be
in the following range:
Minimum length 3
Maximum length 20
Administrator Password
User Password
Set Administrator Password
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

- **Administrator Password**

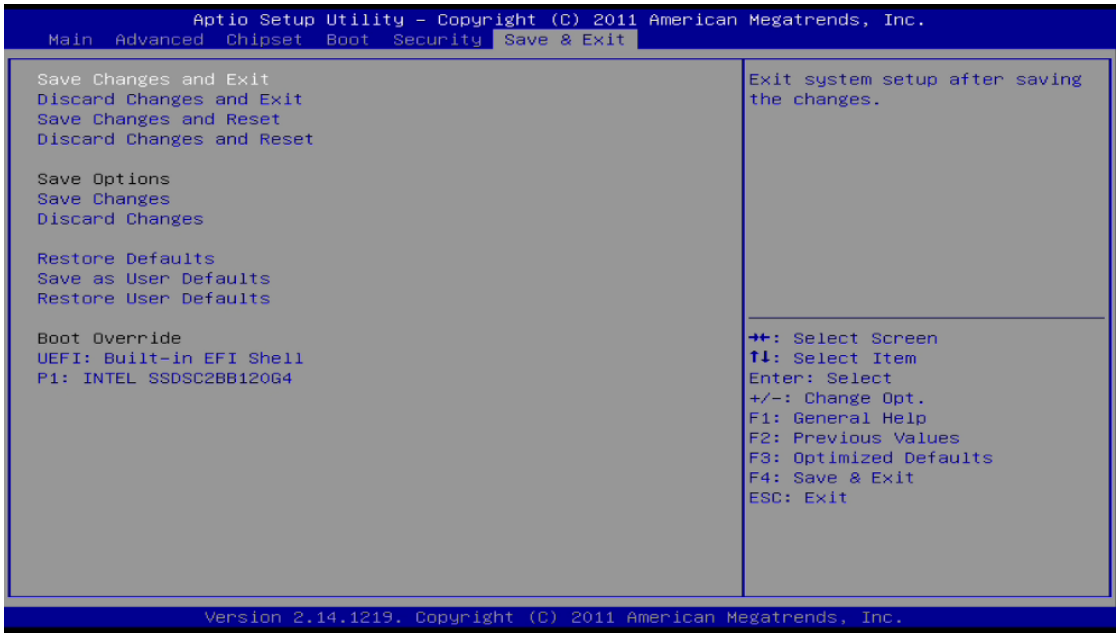
This item indicates whether an administrator password has been set (installed or uninstalled).

- **User Password**

This item indicates whether an user password has been set (installed or uninstalled).

4.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- **Save Changes and Exit**

When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

- **Discard Changes and Exit**

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

- **Save Changes and Reset**

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

- **Discard Changes and Reset**

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

- **Save Changes**

When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

- **Discard Changes**

Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

- **Restore Defaults**

It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

- **Save as User Defaults**

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

- **Restore User Defaults**

It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

- **Boot Override**

Select a drive to immediately boot that device regardless of the current boot order.

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Appendix
Watchdog Timer

About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

Assembler Sample Program

Following is example to enable configuration by using debug tool.

- **Enable WDT**

1.Enable configuration
-O 2E 87
-O 2E 87

2. Select Logic device:
-O 2E 07
-O 2F 08

3. WDT Device Enable
-O 2E 30
-O 2F 01

5. Set timer unit
-O 2E F0
-O 2F 00 → (00: Sec; 08: Minute)

4. Set base timer:
-O 2E F1
-O 2F 0A →Set Reset Time (Ex.0A:10 Sec)

- **Disable WDT**

1.Enable configuration
-O 2E 87
-O 2E 87

2. Select Logic device:
-O 2E 07
-O 2F 08

3. WDT Device Disable